

THE IRON AGE

New York, June 6, 1918

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WAREHOUSES

NEW YORK

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NATION WIDE STEEL-SERVICE

CHICAGO NEW YORK ST.LOUIS DETROIT



NEW YORK PLANT

WE MAINTAIN IN OUR NEW YORK PLANT STOCKS OF PLATES, BARS, STRUCTURALS, SHEETS, TUBES, RIVETS, ETC., THIS ENABLES US TO SUPPLY, PROMPTLY FROM STOCK, THE NEEDS OF THE GENERAL MANUFACTURING INDUSTRIES IN THE EAST AND ALSO THE INCREASED DEMANDS OF SHIP-BUILDERS AND OTHER WAR PROGRAM REQUIREMENTS.

JOSEPH T. RYERSON & SON
IRON STEEL MACHINERY

THE IRON AGE

New York, June 6, 1918

ESTABLISHED 1855

VOL. 101: No. 23

The New Lakey Foundry at Muskegon

Designed to Take Advantage of Conditions of Site, a Basement Provided Along Each Side and Across the Ends

BY HARRY C. SPILLMAN

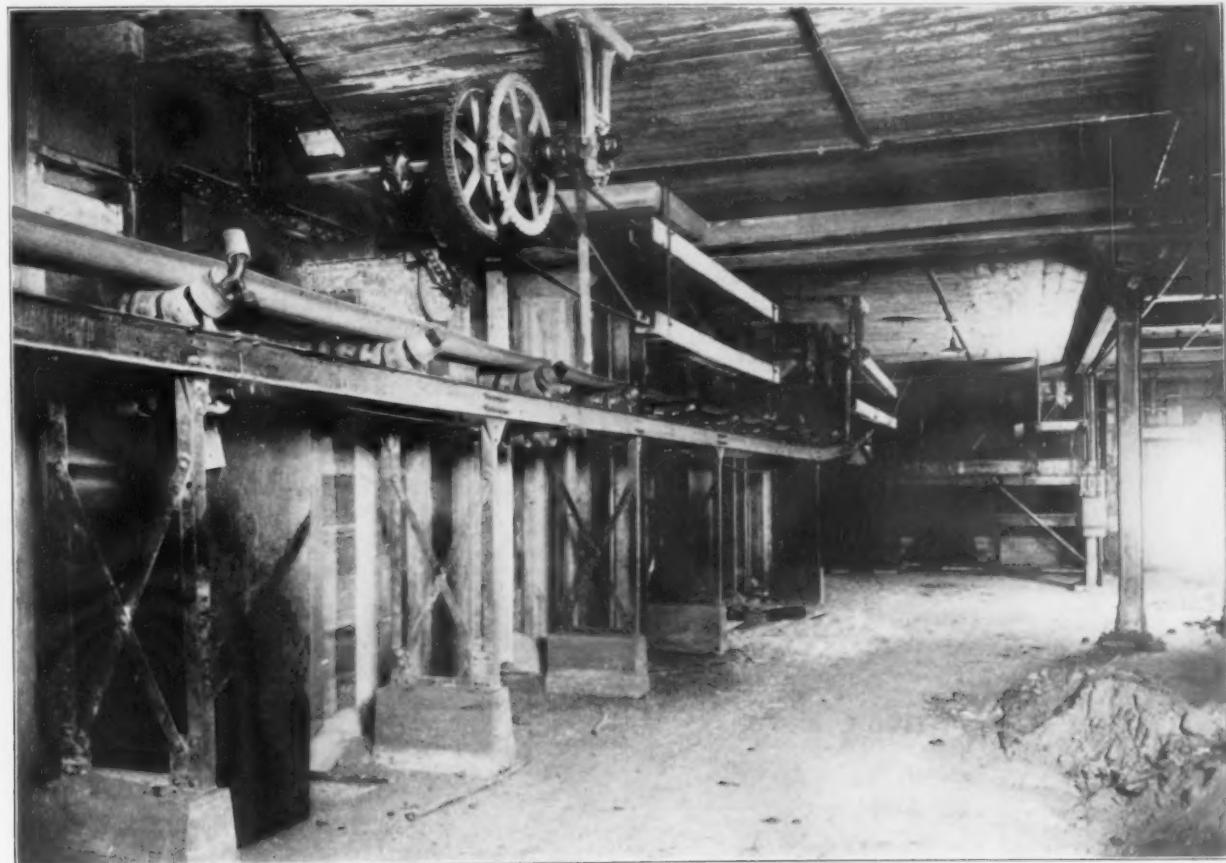
WHEN our manufacturers are again compelled to meet European competition in the world's trade they will find that foreign manufacturers have been developing quantity production and will be in a position to compete with us. If we are to maintain a foothold, it will mean that some of our older methods will have to be discarded. The labor shortage during the last few months has awakened us to the fact that time study, efficient handling and routing of material, progressive manufacturing and labor saving devices are predominating factors in keeping up production.

Unfortunately the great deluge of work has demanded buildings to be erected with great haste and very little planning has been done to have the building designed to suit the requirements. A

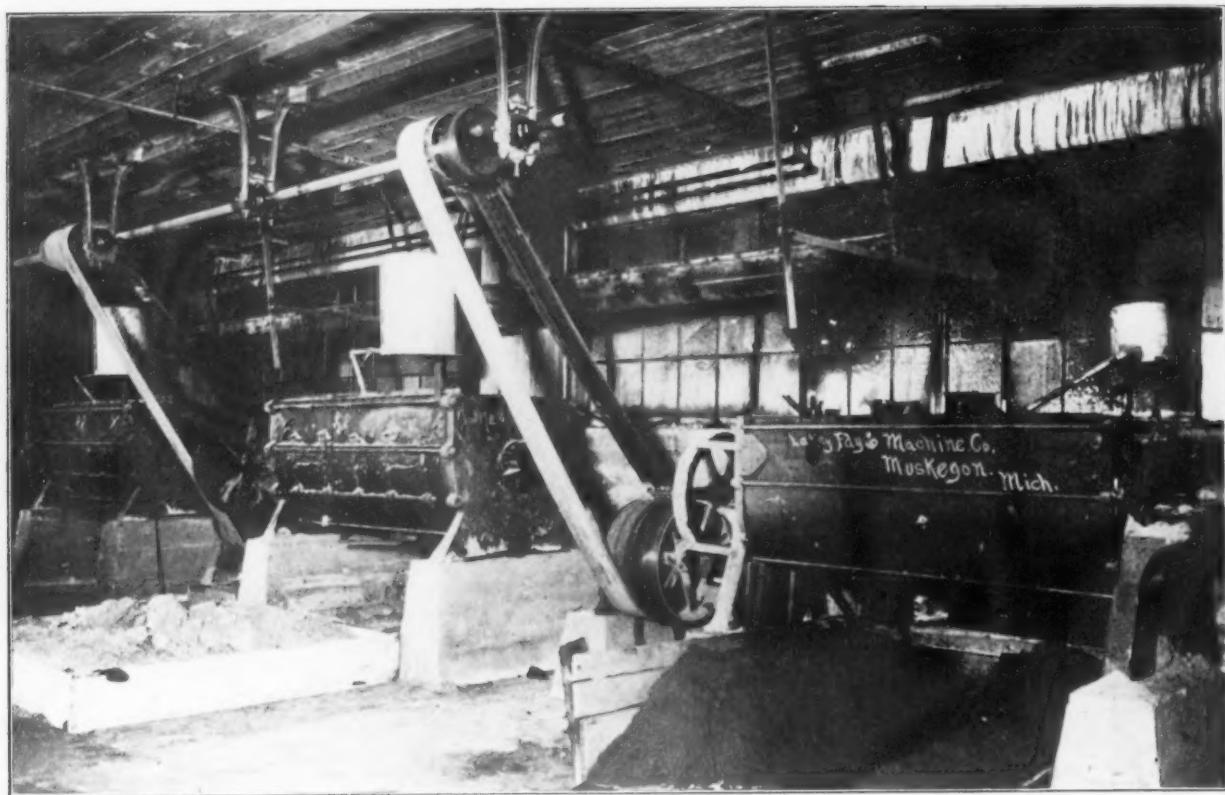
large number of new plants and extensions to old plants have shown little or no thought given to the proper kind of building to house the equipment.

Foundry buildings should be given the same foresight as a modern power plant; the equipment in a foundry should have a building designed especially to meet its requirements. Unfortunately most foundries are housed in a mere shack having very little attention given to proper ventilation, heating or arrangement of equipment. A building erected to meet the special needs of an efficient foundry is of rare occurrence.

The new foundry of the Lakey Foundry & Machine Co., at Muskegon, Mich., shows what can be accomplished by giving the subject careful study. Not a single item stands out above the rest as of special importance, but taken as a group or the



Core Sand from the Bins is Delivered by Screw Conveyors to the Belt Conveyor and Thence to the Sand Screen at the Extreme End.



Screened Sand Is Delivered to the Mixers from a Screw Conveyor and Is Carried to the Core Makers on the Floor Above by Means of a Pneumatic Elevator

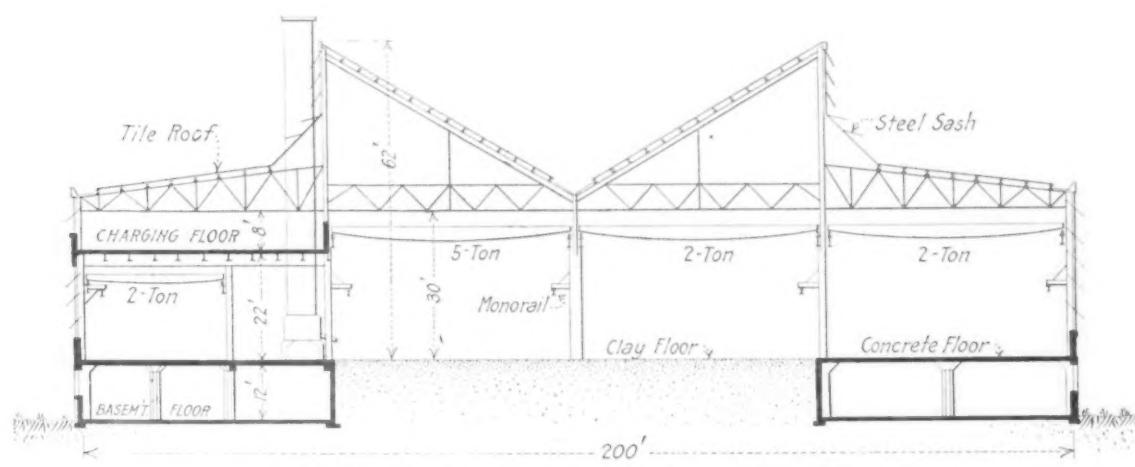
foundry as a unit they clearly prove that good foresight and efficient methods are money savers in producing castings. The entire outlay is designed to handle material with the least possible labor and at the same time avoid automatic equipment which would have a tendency to tie up production in case of a breakdown or a delay in some department. The foundry manufactures automobile castings on a production basis which calls for 100 tons of castings per day in numerous sizes ranging from a few ounces to over a hundred pounds in weight.

A site was chosen having a lake frontage, which allows an inexpensive method of disposing of the foundry refuse. The street level is about 20 ft. higher than the water level and the ground has a gradual slope to the lake with the railroad tracks near the water edge. This makes the basement of the foundry at the same level as the railroad tracks and the first floor at the same elevation as the street. It allows the sand to be easily unloaded in the basement and the foundry refuse handled by gravity. The foundry was built as a complete unit

in itself without allowing for future extensions. It is planned to duplicate the plant as production increases; this will divide the foundry into isolated units each complete in itself.

To avoid long hauls from one operation to another, the building is nearly square, 310 x 200 ft., having four bays the full length instead of the customary narrow foundry with additions added at different points. The basement extends under the two outside bays and across the ends, which gives a basement under the ramming floor and core room. This will be appreciated by the foundrymen, as it gives a smooth floor for these departments and one far more sanitary than usual. The second floor extends along the entire outside bay and across the end. This arrangement gives a very large charging floor and allows the sand to be fed to the molders by gravity.

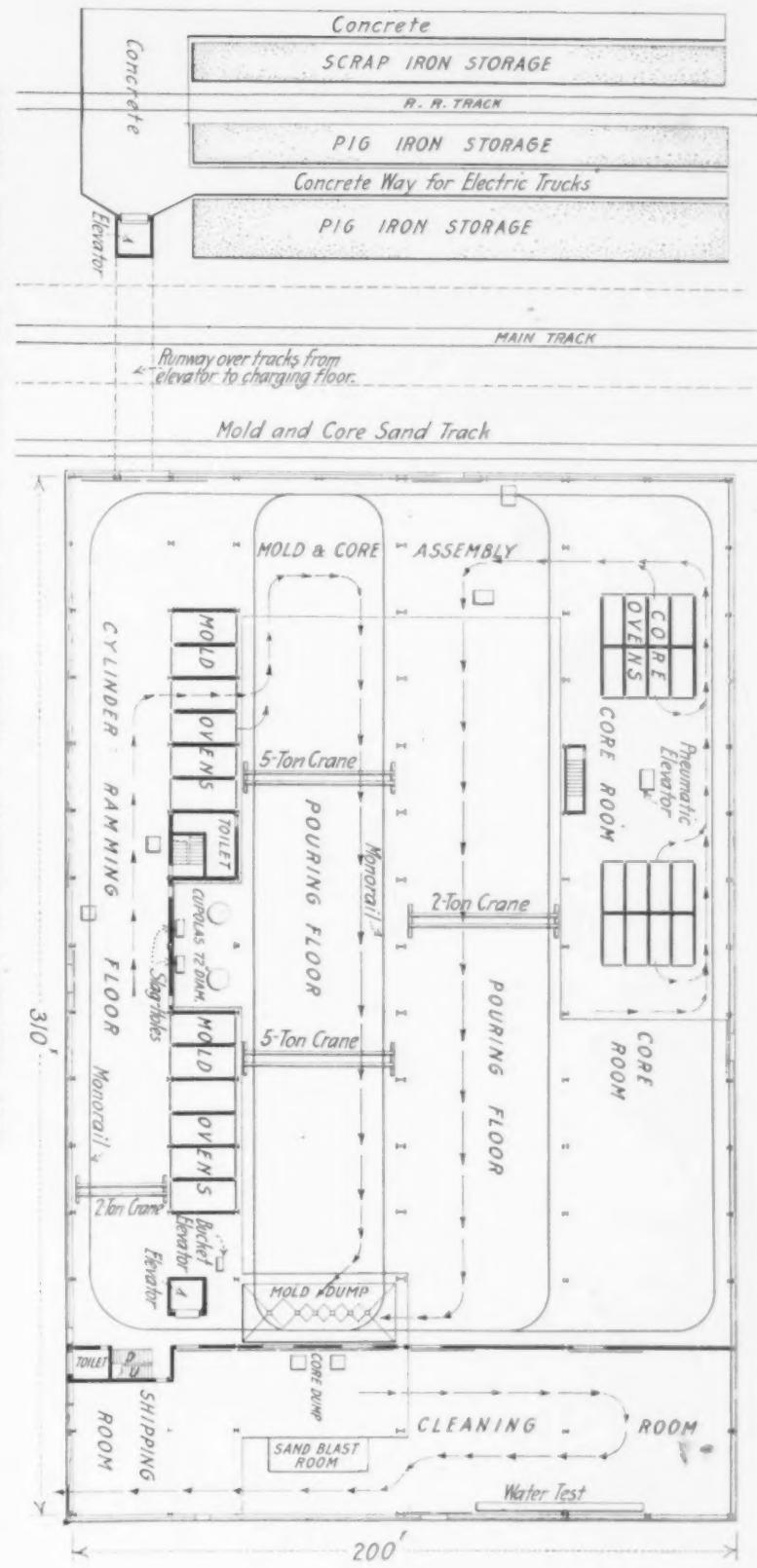
The entire building is made sanitary and fire-proof by the use of reinforced concrete and structural steel. Detroit Steel Products sash and Federal cement tile roof encloses the entire sides and



The Cross Section Shows the Basement Space Along Each Side



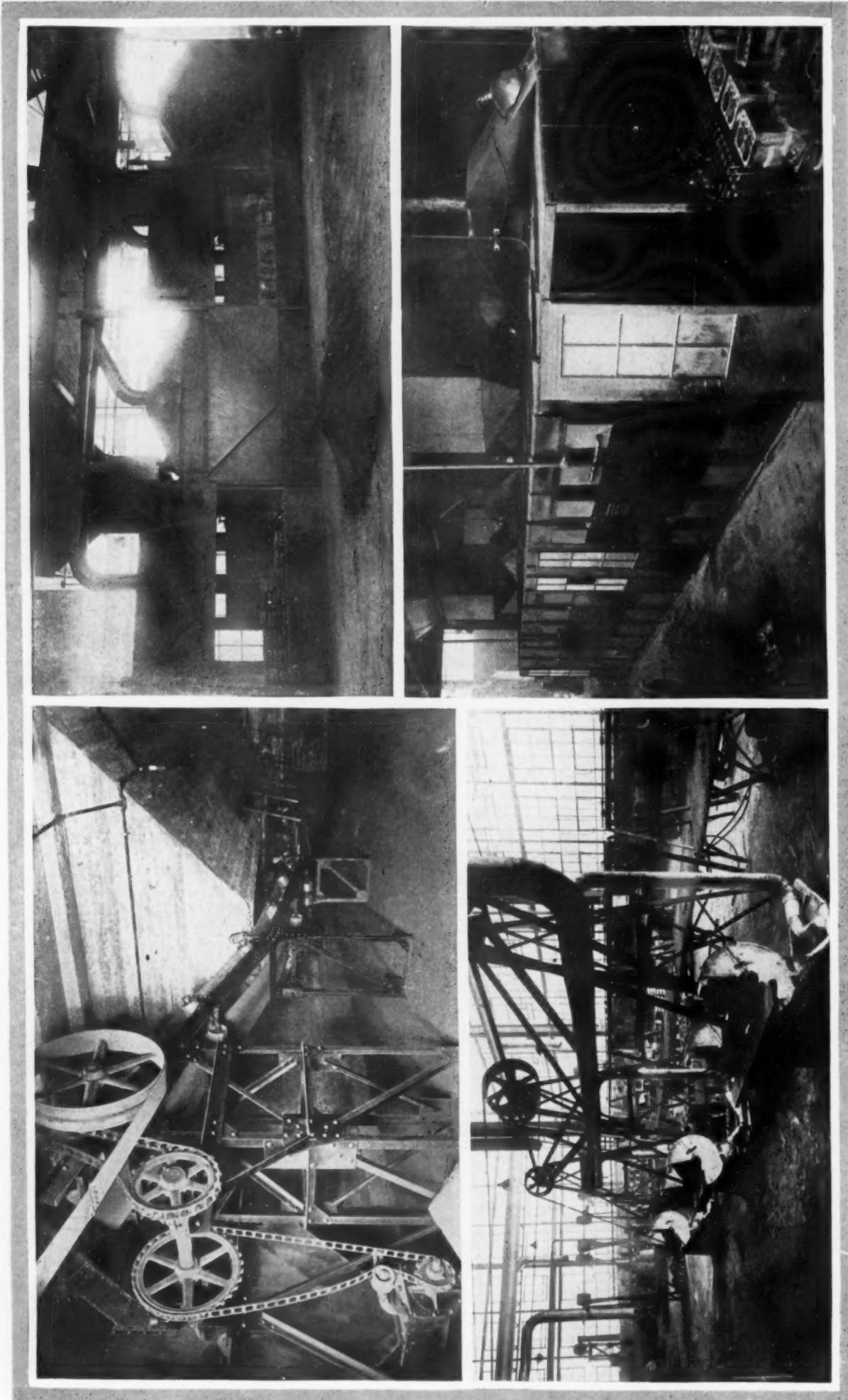
GENERAL PLAN OF THE FOUNDRY OF THE LAKEY FOUNDRY & MACHINE CO., MUSKEGON, MICH.



roof. The ventilation of the building was given careful study and there are no signs of condensation in any part of the building regardless of weather conditions. A flood of daylight in every part of the building and an efficient heating system by forced air makes excellent working conditions for a foundry. The heating is taken care of by two American Blower Sirocco heating units driven by electric motors. All available floor space is covered by means of foundry cranes built by the Shaw Electric Crane Co. and also a flexible monorail system, which assists the cranes in moving material, takes care of the distribution of flasks and transfers material from one bay to another.

The handling of the core sand has proved very efficient. The sand is unloaded by means of a locomotive crane directly from the cars into the bins located in the basement. A screw conveyor flush with the floor and covered with plates is located every few feet in the sand bins. By removing small covers the sand drops into these conveyors and is delivered by means of vertical bucket conveyors to the main belt conveyor, shown in one of the illustrations. This belt conveyor delivers the sand to a power operated screen. The screened sand is delivered directly to the sand mixers, also shown, by a screw conveyor having slide valves over each mixer. The sand ready for the core makers who are located on the floor above is de-

livered to them by means of a pneumatic elevator. The molding sand is also stored in bins located in the basement. After the casting is poured the crane picks up the mold and dumps the entire contents on a large grating. The mold sand falls through the grating into a large concrete bin (25 x 50 ft.) located in the basement. By means of hand operated valves under the bin the sand drops to a belt conveyor and is carried to the power screen. The screened material is taken to the second floor by a vertical bucket conveyor and placed in storage bins. It is fed as needed into Samson mixers, where it is dumped in carts and passes through individual chutes to the first floor directly to the molders.



Upper Left: Mold Sand Bin Under Mold Dump and Belt Conveyor
Lower Left: Snagging Room

Upper Right: Sand Blast Rooms
Lower Right: Sand Blast Rooms

The castings and cores which are left on the gratings pass directly to the core dump, the core refuse drops into a bin and is carried to the lake dump which is a short distance away. This makes an inexpensive way of handling the refuse. The sand blast rooms are located near the core dump and the material is laid on a shelf in the sand blast rooms through vertical sliding doors. From the sand blast it is taken to the water test, snagging room and shipping rooms.

The sand blast sand is very inexpensive in Muskegon and no effort is made to reclaim it. The sand after being used passes in a hopper in the basement and is conveyed with the used core sand to the water dump. The dust from the sand blast rooms is conveyed by galvanized piping to the dust arresters. The sand is stored in bins on the second floor and drops by gravity into the sand dryers below the bins. From the dryers it passes into a smaller bin located over the sand blast room and the operator fills his sand blast machine as needed. The sand blast equipment is of the Sly and Pangborn types.

The mold and core ovens were designed and built by the H. M. Lane Co. The fireboxes are located in the basement, which avoids the lost space usually found on the first floor, and gives easy ac-

cess to all parts of the furnace. This arrangement allows the entire first floor section of the ovens to be utilized for the baking of the molds and cores, as all the auxiliary equipment is located in the basement. Doors are located at each end of the ovens which keeps the material from retracing its steps.

A study of the first floor layout shows the close proximity of the core, ramming room, and mold assembly departments in relation to the pouring floor. It also shows the easy and rapid method of conveying the material from one department or operation to the next and the advantage of a large basement and second floor.

The material in the yard is handled by a locomotive crane and the coke and iron are taken to the second floor by an elevator and overhead bridge. The large size of the second floor allows several days storage during bad weather and confines all the operations indoors during severe weather conditions. The floor around the charging doors of the cupolas is made of 12-in. channels resting on I-beams, which gives a smooth and durable floor.

The design of the foundry is due to the careful thought of H. Becker, president of the Lakey Foundry & Machine Co., H. M. Lane, consulting foundry engineer, Detroit, and C. M. Caywood, industrial engineer.

PRICES OF MANGANESE ORE

Schedule for Domestic Product, with Premiums and Penalties

WASHINGTON, June 4.—The War Industries Board has approved a schedule of prices on manganese ores produced in the United States agreed to by the American Iron and Steel Institute. Because of developments in connection with legislation pending in Congress designed to stimulate the production of manganese in this country the prices have been fixed at figures higher than those that have prevailed during recent months. No announcement is made as to the length of time that the new schedule is to remain effective, and it is surmised that the reason for this omission is also to be found in the pending resolution. The Foster bill, which provides for the governmental control of manganese, has passed the House and is now before the Senate Committee on Mines and Mining, but the date of its final enactment cannot be foreshadowed. Under these circumstances the War Industries Board is not disposed to make any hard and fast rules as to the periods during which price schedules shall prevail as to any of the materials covered by the Foster measure. The new price schedule is effective as to transactions taking place after midnight of May 28. The announcement of the War Industries Board is as follows:

The following schedule gives domestic metallurgical manganese ore prices per unit of metallic manganese per ton of 2240 lb. for manganese ore produced and shipped from all points in the United States west of South Chicago, Ill. This schedule does not include chemical ores as used for dry batteries, etc. The prices are on the basis of delivery f.o.b. cars South Chicago, and are on the basis of all-rail shipments. When shipped to other destination than Chicago, the freight rate per gross ton from shipping point to South Chicago, Ill., is to be deducted to give the price f.o.b. shipping point.

For manganese ore produced in the United States and shipped from points in the United States east of South Chicago, 15c. per unit of metallic manganese per ton shall be added to above unit prices.

Above prices are based on ore containing: Not more than 8 per cent silica and not more than 0.25 per cent phosphorus, and are subject to:

Silica Premiums and Penalties: For each 1 per cent of silica under 8 per cent down to and including 5 per cent, premium at rate of 50c. per ton. Below 5 per cent silica, premium at rate of \$1 per ton for each 1 per cent.

For each 1 per cent in excess of: 8 per cent and up to and including 15 per cent silica there shall be a penalty of 50c. per ton; for each 1 per cent in excess of 15 per cent and

up to and including 20 per cent silica there shall be a penalty of 75c. per ton.

For ore containing in excess of 20 per cent silica, a limited tonnage can be used; but for each 1 per cent of silica in excess of 20 per cent and up to and including 25 per cent silica, there shall be a penalty of \$1 per ton.

Ore containing over 25 per cent silica subject to acceptance or refusal at buyer's option, but if accepted shall be paid for at the above schedule with the penalty of \$1 per ton for each extra unit of silica.

All premiums and penalties figured to fractions.

Phosphorus Penalty: For each 0.01 per cent in excess of 0.25 per cent phosphorus there shall be a penalty against

Prices per unit of metallic manganese for ore containing when dried at 212 deg. Fahr.:

35 to 35.99 per cent inclusive	\$0.86 per unit
36 to 36.99 per cent	0.90 per unit
37 to 37.99 per cent	0.94 per unit
38 to 38.99 per cent	0.98 per unit
39 to 39.99 per cent	1.00 per unit
40 to 40.99 per cent	1.02 per unit
41 to 41.99 per cent	1.04 per unit
42 to 42.99 per cent	1.06 per unit
43 to 43.99 per cent	1.08 per unit
44 to 44.99 per cent	1.10 per unit
45 to 45.99 per cent	1.12 per unit
46 to 46.99 per cent	1.14 per unit
47 to 47.99 per cent	1.16 per unit
48 to 48.99 per cent	1.18 per unit
49 to 49.99 per cent	1.20 per unit
50 to 50.99 per cent	1.22 per unit
51 to 51.99 per cent	1.24 per unit
52 to 52.99 per cent	1.26 per unit
53 to 53.99 per cent	1.28 per unit
54 and over	1.30 per unit

unit price paid for manganese of $\frac{1}{4}$ c. per unit figured to fractions.

In view of existing conditions, and for the purpose of stimulating production of domestic manganese ores, there will be no penalty for phosphorus so long as the ore shipped can be used to advantage by the buyer. The buyer reserves the right to penalize excess phosphorus as above by giving 60 days' notice to the shipper.

The above prices to be net to the producer; any expenses such as salary or commission to buyer's agent to be paid by the buyer.

Settlements to be based on analysis of ore sample dried at 212 deg. Fahr. The percentage of moisture in ore sample as taken to be deducted from the weight.

Payments: Eighty per cent of the estimated value of the ore (less railroad and freight from shipping point) based on actual railroad scale weights to be payable against railroad bill-lading with attached certificates of sampling and analysis of an approved independent sampling chemist. Balance on receipt of ore by buyer. Actual railroad scale weights to govern in final settlement. Cost of sampling and analysis to be equally divided between buyer and seller.

MINIMUM PRICES ON ORES

President's Power to Fix Them Not Affected by Foster Bill

WASHINGTON, June 4.—The champions of the Foster bill providing for Government control of the production, importation and distribution of manganese, chromium, and other so-called war minerals are in receipt of authoritative information from the Senate indicating that that body will not restore the provision stricken out by the House providing for the fixing during the war period of maximum prices of the commodities covered by the measure. Indications point, however, to the restoration by the Senate of the appropriation of \$50,000,000 recommended by the House Committee on Mines and Mining, but reduced by the House to \$10,000,000 over the protests of Chairman Baruch of the War Industries Board and many of the experts who have testified regarding the urgency of this legislation. Notwithstanding the failure of the maximum price fixing provision, which leaves in full force the power of the President to fix guaranteed minimum prices at levels designed to stimulate production, certain interested parties have already begun agitation for tariff protection in connection with the revenue bill to be drafted immediately and it is expected that the United States Tariff Commission will soon begin a series of hearings concerning the advisability of imposing customs duties on several of the more important of the steel hardening metals.

When the Foster bill recently reached the Senate after its rough passage through the House, during which it was radically amended by the elimination of the maximum price fixing provision and the reduction of the appropriation to one-fifth of the amount insisted upon by the War Industries Board, hearings were ordered by the Senate Committee on Mines and Mining of which Senator Henderson of Nevada is chairman. Considerable testimony in addition to that brought out before the House Committee was taken by Senator Henderson's committee and the friends of the bill sought to impress the Senators with the gravity of the undertaking involved in the project of the War Industries Board which contemplates a heavy curtailment of importations of manganese, chromium, etc., for the purpose of conserving shipping space for the transatlantic movement of troops, war material and food. It was pointed out that the Government was assuming a weighty responsibility in seeking to change the source of a large proportion of the current supply of steel hardening metals which are quite as necessary as steel itself to the production of war material. While admitting and even emphasizing the existence of large deposits of manganese, chromium, tungsten, molybdenum, etc., in this country, it was urged that the owners of these deposits could not be expected to invest large sums in their development unless some assurance could be given of an adequate return for a reasonable period.

The fixing of a minimum price for a period of years and probably for the war period and possibly a year thereafter, it was contended, would be absolutely essential to bring about the adequate development of domestic deposits, especially of manganese. If the Government would supervise the industry, allocating both importations and domestic output, at the same time guaranteeing a minimum price that would show a reasonable margin of profit and that would protect the domestic producer against a tremendous slump, which it is apprehended would speedily follow the termination of the war, every favorably located deposit would be developed as speedily as possible and the result would be not only an adequate supply of war minerals for governmental and commercial purposes, but the creation and establishment of a domestic industry of large proportions and of the greatest possible importance to the nation both industrially and from the standpoint of the national defense. Director George Otis Smith, of the United States Geological Survey, in commenting on the present high price of manganese, which Senators

as well as Representatives have quoted as affording all the encouragement necessary to develop domestic deposits, declared emphatically that the fixing of a moderate price to continue in force for two or three years would be vastly more beneficial and would be much more apt to stimulate production than any price subject to fluctuation no matter how high it might be.

It is expected that the Foster bill will be reported to the Senate in a week or 10 days and negotiations are already on foot to secure its early consideration. There is certain to be an extended debate on the measure and it is more than probable that considerable time will be consumed in harmonizing the House and Senate drafts of the measure in conference, as the House leaders will stoutly oppose the restoration of the original appropriation, Congressman Sherley, chairman of the House Committee on Appropriations, having acted as the leader of the contingent in the House which succeeded in cutting down the amount carried by the bill.

Aluminum Maximum Prices Advanced

WASHINGTON, June 4.—The President has approved an agreement made between the producers of aluminum and the price-fixing committee of the War Industries Board (after investigations by this committee in conjunction with the Federal Trade Commission as to the cost of production) that the new maximum base price for aluminum effective June 1, 1918, to Sept. 1, 1918, shall be 33c. per lb., f.o.b. United States producing plants, for 50 tons and over, of ingots 98 to 99 per cent pure. Differentials for sheet, rod and wire will be increased by approximately 12½ per cent; differentials for quantity and grade and differentials for alloys will remain as heretofore, i. e., those approved by the price-fixing committee of the War Industries Board on March 3, 1918.

The conditions are as formerly: First, the producers of aluminum will not reduce the wages now being paid; second, aluminum shall be sold to the United States Government, to the public in the United States, and to the allied governments at the same maximum base price; third, they will take the necessary measures, under the direction of the War Industries Board, for the distribution of aluminum to prevent it from falling into the hands of speculators who might increase the price to the public; and, fourth, they will pledge themselves to exert every effort necessary to keep up the production of aluminum so as to insure an adequate supply so long as the war lasts.

The Swedish Iron Industry in 1917

The Swedish production, exports and imports of iron and steel in 1917 were as follows, as compared with 1916, in metric tons:

	Production	
Pig iron	1916	1917
Bar iron	116,300	115,300
Bessemer steel	737,300	824,000
Open-hearth steel	75,800	76,900
	525,500	489,500
	Exports	
Iron ore	5,540,000	5,613,000
Pig iron	226,976	231,244
Iron and steel	299,087	230,204
	Imports	
Iron and steel	299,100	100,400

At the end of December, 1917, there were 320 plants in operation, as against 298 at the end of 1916. Although the production of iron and steel in 1917 was large, there was a considerable diminution in the profits owing to war taxation and to the reductions in prices which were conceded by manufacturers in the interests of agriculture. Export difficulties will presumably increase during the current year owing to the scarcity of tonnage, increased railroad tariffs and the transfer of shipping from the West to the East Coast.

The blast furnace of the Stewart Iron Co., Ltd., Sharon, Pa., has been blown out for relining and repairs. The furnace has been in blast on one lining for only a few days less than five years.

Great Greeting to Charles M. Schwab

American Iron and Steel Institute Salutes Him

J. L. Replogle Also Tendered Enthusiastic Ovation by More Than Eleven Hundred Banqueters—Judge Gary Discusses the War, Which He Says Will Be Won, and Describes the Present Attitude of Washington Toward the Industry—Valuable Papers Presented

THE appointment by President Wilson of Charles M. Schwab to be director general of shipbuilding, which electrified the country a few weeks ago and aroused great enthusiasm everywhere among the Allies, found expression Friday night at the banquet of the American Iron and Steel Institute at the Waldorf-Astoria, following the morning and afternoon sessions. J. L. Replogle, director of steel supply, declared that the appointment of Mr. Schwab was epoch making and the tremendous enthusiasm with which that declaration was received furnished evidence not only that the more than 1100 guests at the banquet believed that it was true, but also that they had come to the full realization that the iron and steel industry, more than any other industry in the country, has come into leadership in working for the winning of the war. Mr. Schwab smiled as he spoke of the pleasant experiences of the past, but he was sobered by the great responsibility that has been thrust upon him and his address was characterized by the most solemn description of the responsibilities which every man, woman and child in this country must shoulder. He was repeatedly applauded with enthusiasm. The reception tendered Mr. Replogle was second only to that accorded Mr. Schwab. It was indeed a hearty tribute.

Mr. Schwab's Address

Judge Gary, in introducing Mr. Schwab, spoke in terms of highest praise of him as a man and an executive and said the President had selected him, not on account of his polities or for any other reason than his great efficiency.

When Mr. Schwab arose, the 1100 guests sprang up as one man and with cheers, handclapping and waving of napkins greeted him. Mr. Schwab stood smiling for several minutes while the enthusiastic demonstration continued and then repeatedly motioned with his hands that it was time for his friends to sit down. When at last they did so, he began in characteristic conversational style, speaking of the delightful similar occasions of other years. "To-night," he said, "it has been a great pleasure to me to listen to Judge Gary's introduction of one of my boys, Leonard Replogle. I have appeared before you many times before and have often acted the clown and told you stories which I cannot tell to-night, for to-night I face you with a heart that is full of appreciation of your kindness and I come burdened with the great responsibility and with the thought that the unmeasured confidence which my friends have placed in me I cannot, must not, disappoint. As I think of the approval which you have given the President's act in calling

me into this service, I must speak to you as my heart dictates."

Mr. Schwab spoke briefly and with much feeling of Judge Gary and of how for 12 or 13 years they had sat side by side working in the institute and declared that Judge Gary was a true friend of every member of the institute.

"With the exception of Mr. King and Mr. Butler," said Mr. Schwab, "I am one of the oldest men in this room in point of service in the steel industry, for I have been working at it for nearly 40 years, and after so many years I should be ignoble if my bosom did not swell with pride and love on account of the confidence which you have expressed in me. We all seek the encouragement and approbation of our fellowmen and I rejoice that because the great steel industry has given its approval of my selection, there has come greater enthusiasm and patriotism to men throughout the country which will mean much in winning this war, but, after all, no individual can be a very great factor. The undertaking is so vast that we must have the hearty support of every man, woman and child in the country. Some of us have been prone to criticise and I, like many others, was not entirely satisfied with all that was being done by the Government, but I should not be fair to myself, if I did not say that the work which has been done by such men as Hurley, Piez, Goethals and others has been magnificent. When this country entered the war, all the shipyards were engaged in building ships for the navy and the yards to build other ships had to be created. I have examined 65 or 70 per cent of the shipbuilding capacity of the country and I wish to say to you that the work which has been accomplished is wonderful. What is needed now is not criticism, but encouragement. If I can impart to others some of the great tumult of patriotism that fills me, I shall feel that I have accomplished much. The men who have the real responsibility are those who are engaged in the shipyards and in all the plants that are making accessories. As Napoleon said, 'Let me win my first battle, and the campaign is won.' We have started at a pace which cannot be stopped.

"During May the United States finished and placed in commission 250,000 deadweight tons of ships. Every working day, two such ships as that launched yesterday by the Submarine Boat Corporation were finished and May will be the month of least production. I do not intend to indulge in prophecy, for that is dangerous, but I will say that you will not be disappointed. It is necessary that every industry connected directly or indirectly with shipbuilding shall be enlisted in this great work. So stupendous is the number of ships that the

contracts for new works now aggregate \$250,000,000. On the Great Lakes from 400,000 to 500,000 tons will be built this year, but that is not enough and capacity will be increased so that next year 1,000,000 deadweight tons will be produced. I am not worried about the steel, for I believe that it will be produced. No industry has more loyally come to the support of the Government than has the great steel industry. The shipbuilding capacity will be increased wherever necessary."

In conclusion, Mr. Schwab spoke eloquently of how in the years to come, after victory had been

won, the members would meet with hearts full of loyalty and patriotism and conscious that all had done their duty. "God bless every member of the institute," he said, and then there was another demonstration similar to the one with which he was greeted at the beginning of his address.

At the conclusion of the enthusiastic demonstration, Judge Gary said that "the enemy might win one battle or ten battles, or even 100 battles, but it would never win the war." This declaration was greeted with tremendous applause from all parts of the banquet hall.

Address by J. L. Replogle, Director of Steel Supply

Mr. Replogle was many times interrupted by applause during his address, which was as follows:

"The last time I was privileged and honored to address you was about three years ago at the Chicago meeting, when I appealed to you for the establishing and maintenance of proper extras and differentials on various lines of steel products.

"So far as proper prices, extras and differentials are concerned, you do not, at present, need any help from me, as this is now looked after in a more capable way by the official committee you have appointed, and my plea during the past ten months is of a different kind: Extra tonnage of the important lines of steel products necessary to win the war! If there is one thing in the world of which I am positive it is this fact, that the direct and indirect war necessities of the United States and Allied Governments in this great emergency are such as to require the entire output of steel which you can make, at least for the remainder of this year. 'War necessities' is rather a flexible term and it has been given much thought and consideration of those in authority at Washington.

"I had a conference Wednesday with the representative of the corset industry. It developed that their profits last year from this great industry aggregated \$40,000,000, and that they require 15,000 to 20,000 tons of high carbon spring steel annually. I am no authority on corsets, but I must confess that after a complete discussion of the subject I was not prepared to dispute their claim that corsets were absolutely an essential.

What Is Essential?

"There have been many lists of so-called non-essential industries prepared at Washington, but they have never been officially issued, as there has never been complete agreements on this subject. All industries are essential from one standpoint or another—if no other, from the standpoint of the owner, and we have preferred to reverse the procedure and prepare a list of the more essential industries, giving them such preference in steel supply, fuel, transportation and labor as are necessary to get the results for which we are all striving.

"It may be surprising to many of you to learn that we now have unfilled orders on the books of the steel manufacturers and on our desks at Washington for 16,800,000 tons of steel for the United States and Allied Governments, and the orders are coming in at a greater rate than they are being executed, although I believe we are near the peak of production. Difficulties of some of our gallant Allies are very great. Coal in Italy is \$140 per ton, and its steel industries are working under great disadvantages. A very large per cent, probably 75 to 80, of the steel and coal in France is now either in the hands of our enemy or within the range of his guns. The requirements of our Allies will be enormous and the least we should do is all that we can do to give them steel when and as needed.

"The railroads of our country need more rails for safety and efficiency of operation, and it is difficult to give them any increase without restricting the production of projectile steel, which is largely rolled on rail mills. The forging plants are now getting under way, and have just reached the point where their consumption of projectile steel will be an extremely heavy factor. The shipyards have their ways built and many keels laid, and under the direction of Mr. Schwab will require vast tonnages of steel. His program for next year is at least double that of this year, and we must furnish him the steel to complete the great work he has to do and for which he is so well qualified.

"The appointment of Charles M. Schwab was an epoch in this war—a great Allied victory and one which caused great consternation in Germany. The expressions of approval of the representatives of the Allied Governments dealing with us were of such a nature as to leave no possible doubt as to how it was received by them.

"When Mr. Schwab called me to his hotel a day or two before he accepted the appointment and told me about it, I felt a measure of satisfaction and joy beyond my expression. I think he has the most dominating, and, at the same time, most winning personality of any man I have ever known, and his enthusiasm and energy will produce such results in shipbuilding as will astonish the world. I may be a little prejudiced in his favor on account of the great tribute he paid to me early in my Washington experience. After one of our steel meetings, Mr. Schwab asked me if it was true that my salary was only \$1 per year, and upon being answered in the affirmative, said, 'By Gad, Rep, I believe you're worth twice as much as you are getting!—\$2 per year. I submit—Was not this a perfect tribute?

Mr. Baruch's Characteristics

"There has been another appointment in Washington, properly met with approval, that of Bernard M. Baruch, chairman of the War Industries Board. He is a man of great ability, determination and quick decision, and is doing wonderful work in this great fight to keep the world a decent place in which to live. My association with him has been such that I can say positively that every move he has made has been directed by fairness and he has done everything possible to promote and foster the prosperity of industries consistent with the one big object of winning the war. He has a most difficult position and is filling it with great efficiency. No important steps have been made by him without full consultation with the industries affected, and, where possible, the ideas of the leaders of these industries have prevailed.

"Some of you gentlemen have felt that we on the War Industries Board have been, at times, critical and severe. There have been times before the acute necessities of war became known, that a few—a very few—manufacturers we felt had been governed a little too

much by commercialism and did not devote sufficient of their product to the lines we felt most necessary, and we have not been slow in calling their attention to this fact.

"At the meeting some weeks ago in Judge Gary's office when the 100 per cent pledge was adopted, I think there was a clearer understanding of the necessities of the situation, and it is incumbent upon me to say, and I do say, with the greatest of pleasure, that to-day 100 per cent of the steel manufacturers of the country are doing their utmost and that there is not a single exception to this rule. You are all doing wonderful work, and with the history of this great cruel war, the work of the steel manufacturers will stand out in the most glowing chapters.

Attitude of Manufacturers

"I have often felt that one of the great achievements of the war was accomplished at the meeting of the steel manufacturers and War Industries Board in September of last year. The manufacturers realized fully that, due to the abnormal conditions created by the war, prices had risen entirely too high and that the burdens of our gallant Allies were already so heavy that the law of supply and demand must temporarily be abandoned. I do not think that our wonderful President has made many more important or proper decisions than that our Allies in this fight were entitled to the same prices on the materials necessary to win this war as our own Government!

"The steel manufacturers and the War Industries Board mutually agreed upon prices, which were officially approved by the President, and which, while involving a reduction, in some cases as much as 75 per cent from the standards then prevailing, and which were constantly increasing, I think to-day are considered by all of you fair and reasonable. The difference in a year's output meant a saving of between two and three million dollars. There was no statute of law for this action, and the War Industries Board was not vested with legal authority to compel such an action, and it was, therefore, entirely a voluntary one on the part of the steel manufacturers, and is, I believe, one of the most glorious chapters of the war.

"I believe that the understanding of all manufacturers as to the acute necessities of this war was all that was needed to secure the 100 per cent co-operation which we are now receiving from them. We believe that this same understanding is due the steel workers in your mills and factories. I do not feel that they entirely appreciate what a great and glorious part they can play in winning this war—in working steadily, in working to the highest degree of efficiency—which would come to them with a full realization of the necessities.

"The industrial worker in these days is almost as important to the successful conclusion of this war as

Judge Gary's Address

Departing from his usual custom Judge Gary, as president of the institute, spoke extemporaneously at the opening session Friday morning. He referred briefly to meetings of the past eight years and to the fact that at some of them men were present from Germany and Austria, men of high type who, if in the control of the affairs of their respective countries, would prevent a continuance of the war. He said that war conditions in Europe to-day are not only deplorable but desperate. "We have for some time realized and we see more clearly than ever before," said he "that the commencement of the war was deliberate and was influenced by a desire on the part of a few individuals, comparatively speaking, to rule the world by might."

"It would be useless," continued Judge Gary, "to discuss what ought to have been done to prevent certain conditions. We are not at this time particularly

the man in the trenches. He is playing no small part, and every effort should be made to have him realize this. Much has been done along this line, but I believe that much additional can be done by mass meetings such as have been held recently by Midvale Steel & Ordnance Co., Jones & Laughlin Steel Co., Lukens Steel Co. and other manufacturers. I think many of you have seen the poster used by these companies and the text of which I propose to read to you, as I feel that it is one of the best methods of instilling in the worker, the enthusiasm for his work which is necessary to get the best results."

(The poster read by Mr. Repleglo was published in THE IRON AGE May 23, page 1339.)

Other Speakers at the Banquet

Ex-Congressman John J. Fitzgerald of Brooklyn delivered an able address telling of the wonderful achievements of the United States during the first year of the war, speaking particularly of the work of Congress of which he was a member for 19 years.

Major General Glenn, who has been in command of Camp Sherman, Chillicothe, Ohio, during the past year, and has made a splendid record in the training of young men, was called upon and spoke of the work which has been done by the army and of the importance of not permitting Germany to command the cheap labor of Russia, India, and other countries in the Far East. "If," he said, "Germany does succeed in getting control of this labor, competition will be most severe for all other nations."

Dr. Thomas Darlington, director of the welfare work of the American Iron and Steel Institute, delivered a very earnest address on the importance of business men, especially those of middle age, taking care of their health. He said that there has been talk about examining employees, and it was all right to do so, but if medical examinations were good for the employees, it was also good for the employers. In conclusion he announced the following ten commandments:

TEN HEALTH COMMANDMENTS

1. Keep your mouth closed when breathing; also when angry.
2. Drink cool water with your meals, also between them.
3. Bathe daily, a shower, if possible.
4. Eat slowly; this leads to eating sparingly.
5. Never read or transact business while eating.
6. Exercise daily and breathe deeply while so doing, but avoid over-exertion and never eat when fatigued.
7. Work ten hours, sleep eight, and use the remainder for recreation and meals. Always rest on Sunday.
8. Always keep a contented mind. Equanimity means longevity.
9. Neglect no portion of the body. Employ a physician to examine you medically at regular intervals and so watch for the beginnings of disease and build up resistance.
10. Moderation in all things. Even virtue in excess may become a vice.

concerned with the past. Many of us, probably most of us, perhaps all of us who are present on this occasion, would have done things some years ago that were not done. Some of us at our regular steel meeting in October, 1914, as forcibly as we could, presented our views as to what should be done. But that is a thing of the past. There were reasons for non-action. Whether they were good or valid we need not talk about at the present time.

"It would not be useful now to refer in the tone which I have adopted to the awful things that from our viewpoint are being done in Europe, except for the purpose of emphasizing in the strongest words and in the best possible manner the fact that we personally are not without courage, we are not without vision, we are not without appreciation of our responsibilities. The people of this country, represented by such as you,

will never give up this fight (applause) until (what we believe is not possible), Germany comes to this country and actually conquers and subdues the people who are here.

"In defense of the rights, the liberties of the men of this country, in defense of civilization itself, we do not care what the expense is or will be, provided it is equitably distributed, and provided, to the best of the ability of honest and faithful men, the money is well expended. (Applause.)

The Part of the Steel Industry

"The steel industry is doing much to assist in carrying on this war. The American Iron and Steel Institute has been carrying on a very large work. It is in close communication with the Government officials all the time. It is a source of securing information and distributing it to the Government officials. It is the agency upon which the Government depends very largely for its assistance in carrying on many of the activities essential to the war.

"Some of you know and some of you do not know that the forces of the institute have been very largely increased, that the office room has been extended, and that Mr. McCleary and his faithful associates and assistants, are devoting long hours in securing and furnishing to the Government such aid as it needs and calls for. The institute under this management is a credit to all of us and it is of real value to the Government, to the public. It has approached the position which eight years ago we all hoped it might in the course of time reach. We may well be proud of the fact that we decided to form this institute, and that we have so faithfully stood by it. The general committee, appointed by the directors of the institute, having been doing valiant service. They have been devoting a great deal of time; they are giving all the affairs in their charge, by direction of the Secretary of War and the Secretary of the Navy and the War Industries Board, their best thought and their energies in an endeavor to serve the Government faithfully and at the same time to protect the interests of the whole steel fraternity of this country; and in referring to these matters I always intend to exclude myself.

"It is a matter of gratification and it should be of peculiar pride to all the members of the institute that they have such a general committee, well disposed, well trained, and well fitted to carry on this very great work. And the sub-committees have all been doing splendid service and very hard work. You are familiar with the different committees. Some of you are not familiar with their work, but you would be surprised to know, perhaps, that many of these gentlemen work from early in the morning until late in the evening in their endeavor to carry on the work which is submitted to their charge, and they are doing it with very great satisfaction to all who are familiar with what they are doing and who are depending upon the results.

Patriotic Service

"It has been a source of pride to me when I have noted the results of the work, much of it on paper, and too much praise cannot be given to them for their willingness, patriotism, and at the same time their loyalty to the members of the industry who devote their time and energy and skill to this work; and I am very sure that all the members of the iron and steel fraternity ought to be very well satisfied with what is being done for them by a comparatively few individuals.

"We sometimes get complaints, although good-natured, from different lines of the business, in regard to the effect of decisions upon their particular business. These are never ignored, but are always carefully considered. The effort is made to correct mistakes and, if possible, to secure better conditions for the one who complains, but always with the intention of doing exact justice between all the different lines of this industry and between the steel producers and the Government.

"There has never been any decision or any action so far as I know on the part of the men connected with these committees which has been actuated by any selfish motive or consideration. So far as I have noticed, and I have endeavored to give pretty careful attention,

there has never been a determination on the part of any members of these committees which anyone connected with any branch of this industry could complain of on the ground that it was unjust, illy considered or based on anything but the desire to be fair to all concerned.

The Whole Industry

"And now may I say a word for the whole industry represented here to-day? I have on many occasions expressed my opinion of you and your associates. I have spoken in your favor, but I have never said half enough. Steel men have marched up to the point of obligation at every opportunity with the most patriotic, the most loyal, the fairest disposition, having in mind the one idea of trying to serve the country faithfully, in total disregard of personal gain or success.

"Wherever duty and obligation to the country and personal interest or personal pride have come together in opposition, so far as I know without exception personal interest and personal pride have been subordinated. Could anyone say more of any other man or any business than that? It is easy to talk. We all make claims of loyalty and patriotism. We are inclined to assert that it is our disposition to be just, but I am not talking about what the steel men have said; I am, rather, stating what I know by personal contact they have done. Whatever may happen in the future to us, to our business or to our country, we shall have the satisfaction of knowing that we did our best, and we did it patriotically, with pure motives and with a desire to render service that our friends and our children may always know was well rendered.

"Now, this disposition and action on the part of the steel people has had its effect in Washington. There have been times when our whole business was by some criticised unfavorably. Even since the war your general committee has met officials in Washington who at first seemed disinclined to render fair judgment or to grant what, under all the circumstances, we believed we were entitled to.

Reports in Newspapers

"You have read in the newspapers that it was the disposition and the intention of the Government officials to take possession of the iron and steel industry and manage it, and you have read that it was proposed to do or not to do a good many things which seemed to you unfair. I cannot speak for the future. I do not know what may happen. I do know that it frequently turns out—there are Government officials as well as others who prove to be incompetent to fill the positions which they occupy, and there is always danger of a mistake being made, and of course we may have reason for apprehension, but we can speak of the present and the past—that we know, and I believe my associates on the committee will confirm what I say: that after we have met the officials in Washington and have had full opportunity to discuss with them the questions raised or the action proposed, the final result has been, though not entirely satisfactory to us, yet in the main proper, all things considered.

"There have been times when we have been more or less discouraged. Claims have been put forth that were not justified by the facts and the figures, and at times it has seemed to us temporarily there was great danger of our lines of business being injured and perhaps jeopardized, but by patience and perseverance and discussion we have been able to avert disaster, at least, and have generally secured what was appropriate, certainly from the standpoint of the Government officials."

"I am not seeking praise for our committee, nor attempting to do more than to satisfy you that your representatives have been faithful and diligent and have shown skill and wisdom and that you have made no mistake up to date in submitting your affairs so generously to this committee for management. These results have been brought about by the splendid, generous trust which you gentlemen have reposed in your committee, and the fine spirit of patriotism and loyalty which you have displayed by your attitude.

"To-day you will hear very little, if anything, in Washington against the iron and steel industry. You have demonstrated that the professions which you

have been making during the last 10 or 11 years were sincere. You said in your speeches at your meetings time after time that you had no improper intention relating to your management, that you were not disposed to do anything which would be injurious to the public interests, that it was a cardinal doctrine of the iron and steel men that they hoped to be of real benefit to the public, and that their management, so far as it could be controlled by those in authority, would finally be proven to be above reproach; and I believe all Washington is of that opinion at the present time. (Applause.)

"The public press generally, long ago, gave you credit for right motives and right conduct. As a rule, it has been splendid in its appreciation of the service and the intention of the steel people during these years; though there was a different feeling in the minds of some of those in high public positions. I believe that has passed, that it has been eliminated.

"We find to-day Government officials in high places coming to the steel men with the statement that they want to co-operate with us, that they want our assistance; that they depend upon our loyalty and our ability to assist the Government in this time of great distress.

"It is to my mind a source of gratification that we may look forward to the future with hope and expectation that the Government of the United States is going to assist, to foster prosperity and business enterprise, instead of attacking it. (Applause.)

We must remember always that we cannot expect to get more than our just desserts, and we must be loyal to the Government and loyal to the law of the land, and we must be reasonable and just, and expect that when we deserve punishment or censure we will get it from the Government. Carrying our minds back to the dark business days of 1907 and some that followed, and to the words spoken by many of the gentlemen now here concerning their intentions—we know all meant what they said; you have proven this. We know that in the future your acts will correspond with your heretofore expressed intentions and therefore that we may not only hope but we may expect there will be co-operation between the Government and the business people, and that consequently this country, if we succeed in this war, will have reason to occupy the highest and best position of all the nations of the earth.

Getting in Better Condition

"We are doing another thing, gentlemen, and the Government is permitting us, assisting us, urging us to do it. We are day by day putting our affairs in

better shape; we may not be making so much money, or if we do make it we may be paying it out in taxes and in extensions to our works for the benefit of the Government at such cost that we are absorbing our profits, but, nevertheless, we are putting our works in better condition; we are being better prepared for the future, the iron and steel industry will be on a better basis and a better footing than ever before; well prepared to succeed in the contest and the competition for international trade. If we win the war, that will be worth something to us, if we do not save much in cash. If we lose the war then it is not so important whether we have anything or not. (Applause.)

"On the whole, gentlemen, our business is good. We at least have a steady customer, and one able to pay. (Laughter and applause.) Our prospects at the present time, notwithstanding the horrors and the cost of the war, are good.

"We have reason to be hopeful. The man who recognizes the dangers and the difficulties which are in sight is not necessarily a pessimist. I prefer the man who takes a broad vision, which covers disasters and possibilities of destruction, but puts his back up against the wall, and with his teeth shut proposes to fight it out until success is achieved. (Applause.)

"I do not care for the man who is so optimistic that he never sees anything but sunshine and prosperity and happiness, for he never accomplishes anything worth while.

"Gentlemen, this is a time for judgment, for patience, for level heads, for patriotism, and, above everything else, the grit that stands and fights and never gives up. (Applause.)

"For the long future I am an optimist. I believe we will win this war. (Applause.)

"Why will we win it? Because, first of everything, we are right. (Applause.) We ask for nothing that is of pecuniary benefit to us, and which belongs to anyone else. We seek no territory. We are not even vindictive. We have no disposition to punish the evildoer from mere vindictiveness. But we know our rights and we seek our rights, and we have the brains and the ability and the courage to stand for them until they are secured. (Applause.)

"Gentlemen, after the war is over, when history is written up, the fair-minded man who writes the account will say that in the ranks of the hosts of really fighting men, with fighting disposition, were the members of the iron and steel industry of America. (Applause.)

"We know as they knew that we have the right on our side, and that the other side has nothing but might." (Applause.)

Valuable Papers Presented

H. H. Wheaton of the Interior Department, spoke for five minutes on the subject of Americanization, particularly in the interest of a bill for the promotion of the education of resident persons unable to speak the English language; to provide for co-operation with the states and territories in the promotion of the education of such persons in the English language and the fundamental principles of the Government and citizenship of the United States; to provide for co-operation with the states and territories in the extension and creation of facilities for such education and the preparation of teachers, supervisors and directors of immigrant education, and to appropriate money and regulate its expenditure. The institute voted to refer the matter of endorsing the bill, which is soon to be placed before Congress, to the directors.

The papers were of a uniformly high order. Some of them are published elsewhere in this issue and some will appear in later issues of THE IRON AGE, as will also some of the papers presented as a part of the discussion. The papers were as follows:

"The Electric Steel Plant at South Chicago," T. W. Robinson, vice-president Illinois Steel Co., Chicago.

"The Design of the Modern Blast Furnace Stack," J. G. West, Jr., general superintendent blast furnaces, Jones & Laughlin Steel Co., Pittsburgh.

"The Modern By-Product Coke Oven and Its By-Products," W. H. Blauvelt, consulting engineer, Semet-Solvay Co., Syracuse, N. Y.

"Effect of Phosphorus in Soft Acid and Basic Open-Hearth Steels," J. S. Unger, manager Central Research Bureau, Carnegie Steel Co., Pittsburgh.

"Conservation of Ferromanganese," C. R. Ellicott, superintendent furnaces and mills, Lehigh plant, Bethlehem Steel Co.

"Relation of the Trade Papers to the Iron and Steel Industry," Bertran S. Stephenson, M. A. Hanna & Co., Pittsburgh.

Submarine Officers Needed

Conant Taylor, lieutenant commander, United States Navy, U. S. Submarine Base, New London, Conn., announces that the submarine force of the United States Navy requires the services as officers on board submarines, of young men who have had technical training in mechanical and electrical engineering and who have had experience in these professions. It is intended to enroll a number of such men as provisional ensigns in the Naval Reserve Force, give them a course of instruction in deck duties at Annapolis and a course in submarine work at New London. Those who successfully pass these courses will then be sent on board submarines for regular duty.

It is requested that any men who desire this duty and who are qualified send their names and addresses to the Commander Submarine Force, U. S. S. *Chicago*, care of Postmaster, New York.

CORRESPONDENCE

Duty of the Employer Toward the Crippled Soldier

To the Editor:—Soon after the outbreak of the hostilities the European countries began the establishment of vocational training schools for the rehabilitation of disabled soldiers. They had both the humanitarian aim of restoring crippled men to the greatest possible degree and the economic aim of sparing the community the burden of unproductivity on the part of thousands of its best citizens. The movement had its inception with Mayor Edouard Herrot of Lyons, France, who found it difficult to reconcile the desperate need for labor in the factories and munition works while men who had lost an arm or a leg but were otherwise strong and well were idling their time in the public squares. He therefore induced the municipal council to open an industrial school for war cripples which has proved the example and inspiration for hundreds of similar schools since founded throughout France, Italy, Germany, Great Britain and Canada.

Usual Attitude

In the readjustment of the crippled soldier in civilian life, his placement in employment is a matter of the greatest moment. In this field the employer has a very definite responsibility. The employer's duty is almost diametrically opposite to what one might superficially infer it to be. The duty is not to "take care of," from patriotic motives, a given number of disabled men, finding for them any odd jobs which are available, and putting the ex-soldiers in them without much regard to whether they can earn the wages paid or not.

Yet this method is all too common. A local committee of employers will deliberate about as follows: "Here are a dozen crippled soldiers for whom we must find jobs. Jones, you have a large factory; you should be able to take care of six of them. Brown, can you not find places for four of them in your warehouse? And Smith, you ought to place at least a couple in your store."

Such a procedure cannot have other than pernicious results. In the first years of war the spirit of patriotism runs high, but experience has shown that men placed on this basis alone find themselves out of a job after the war has been over several years, or, in fact, after it has been in progress for a considerable period of time.

A second weakness in this method is that a man who is patronized by giving him a charity job comes to expect as a right such semi-gratuitous support. Such a situation breaks down rather than builds up character, and makes the man progressively a weaker rather than a stronger member of the community.

The third difficulty is that such a system does not take into account the man's future. Casual placement means employment either in a make-shift job as watchman or elevator operator, such as we should certainly not offer our disabled men except as a last resort—or in a job beyond the man, one in which, on the cold-blooded considerations of product and wages, he cannot hold his own.

What Should Be Done

The positive aspect of the employer's duty is to find for the disabled man a constructive job which he can hold on the basis of competency alone. In such a job he can be self-respecting, be happy and look forward to a future. This is the definite patriotic duty. It is not so easy of execution as telling a superintendent to take care of four men, but there is infinitely more satisfaction to the employer in the results, and infinitely greater advantage to the employee. And it is entirely practical, even in dealing with seriously disabled men.

The industrial cripple should be considered as well as the military cripple. With thoughtful placement

effort many men can be employed directly on the basis of their past experience. With the disabled soldiers who profit by the training facilities the government will provide the task should be even easier.

The charge of patriotic duty upon the employer is this: To study the jobs under his jurisdiction to determine what ones might be satisfactorily held by cripples. To give the cripples preference for these jobs. To consider thoughtfully the applications of disabled men for employment, bearing in mind the importance of utilizing to as great an extent as possible labor which would otherwise be unproductive. To do the returned soldier the honor of offering him real employment, rather than proffering him the ignominy of a charity job. If the employer will do this, it will be a great factor in making the complete elimination of the dependent cripple a real and inspiring possibility.

DOUGLAS C. MCMURTRIE,
Director Red Cross Institute for Crippled and
Disabled Men, New York.

Those Riveting Records

To the Editor:—It would really seem that somebody should be saying something about these astonishing riveting records which are tumbling over each other in the daily press. We all know that for the winning of the world war the supreme demand is for ships. In the building of the ships the most responsible and the most continuously repeated operation is the riveting. Therefore, of course, speeding up the riveting is speeding up the building and increasing the output of ships.

It is, at first thought, most gratifying to note that a lively rivalry is current throughout the shipbuilding plants on both sides of the Atlantic for the making of riveting records, these being taken, of course, as indexes and guarantees of shipbuilding speed. They may be; but are they? It was said of the Charge of the Light Brigade that it was very brilliant but it was not war. So, without questioning at all the veracity of the current riveting records, we are tempted to say that they may be very brilliant but they are not shipbuilding, if indeed, they can be called riveting.

A shipbuilding pneumatic riveting record is not the record of one operative alone handling a single pneumatic riveter, even with changes or replacements of the tool from time to time. The man usually will be the head of a co-operating gang of six, comprising, besides himself, a backer-up, two heaters and two passer-boys. The making of a pace-making riveting record involves also many more than this riveting gang, who alone get the credit. As suggesting the mass of coincident work involved it is to be noted that the holes must be instantly and constantly ready for the rivets, so the numerous sheets and other members must be successively assembled and clamped in place with all the holes matching absolutely so that every rivet will enter without hesitation, and to make sure of this a plug must be tried in each hole and many of the holes must be reamed. These preliminary operations must all be carried on without getting at all in the way of the riveters. With all these conditions suggested to be complied with, and remembering the minor interruptions which inevitably occur, we are invited at the present writing to believe that in nine hours a single riveter has driven a number of rivets amounting to one every six seconds for the entire period. It paralyzes our believing apparatus.

It would seem to be very difficult for us ever to accept records of individual riveters, such as those now current, as assurances of ultimate shipbuilding speeds. Riveting records of another class are now coming along more deserving of serious consideration. These are the collective records per week, or other period, of all the rivets driven by all the riveters employed upon a single ship or upon a single shipyard way. This would tell us a real story of real shipbuilding, and the record would really tell not only of the actual performance of the riveters but of the co-operation of all hands to produce the desired results.

FRANK RICHARDS.

A Combination Journal and Axle Lathe

To enable carwheel journals to be turned without removing the wheels from the axle, the Niles-Bement-Pond Co., 111 Broadway, New York, has brought out a new machine. This is a combination journal turning and axle lathe for inside and outside journals of the center drive type, the upper portions of the bed being capable of retraction to form gaps for the clearance of the mounted wheels.

Four carriages are provided, two for inside journal turning and two for turning the outside journals. When inside journal axles are being handled, the two outside carriages are used for the wheel seats and the two inside ones for journals. With outside journal axles, the two outer carriages are used for turning the collars, outside journals, sand guards and wheel seats. All four carriages have screw feeds with bronze split nuts and when the gaps in the bed are closed, the carriages will travel up so as to turn the wheel seats of the axles. Three changes of the feed, ranging from $1/12$ to $1/4$ -in., are provided for the carriages, the changes from one rate to the other being regulated by a pull-pin.

The center driving gear has a projecting sleeve or bearing on each side and the gear is split. The power for the drive is transmitted to this gear, which operates at rates ranging from 16 to 48 r.p.m., by a pinion carried in the bed. A hinged cap which provides a continuous bearing for the center gear and also serves as a cover for it is provided for the center head. The

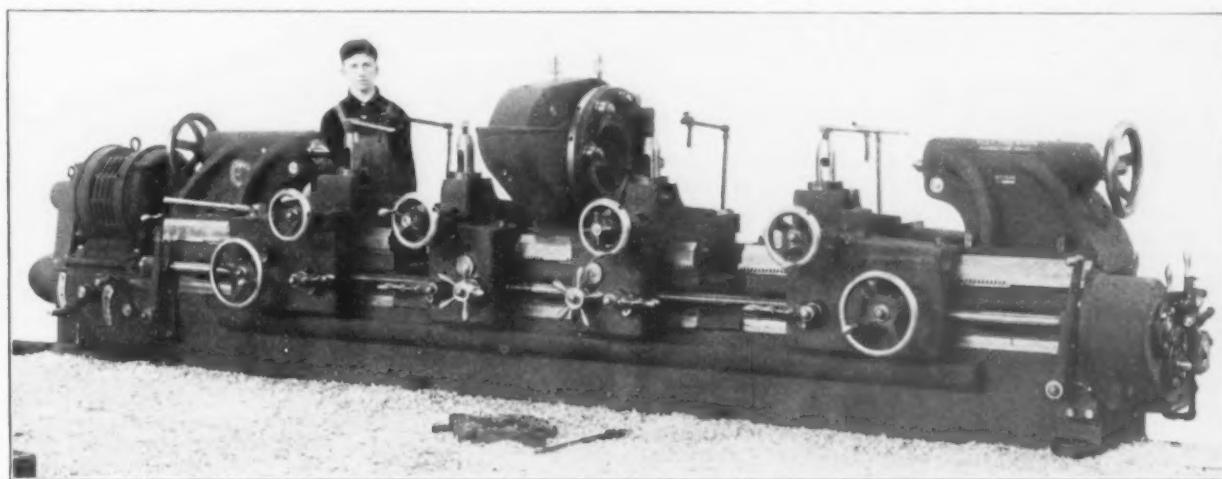
directly to it. This box provides four mechanical changes and the power is transmitted from it to the driving shaft by gearing giving the same number of speeds.

Tests of Acieral, the New Aluminum Alloy

Acieral, the new aluminum alloy, claimed to possess unusual physical and other properties, was described in THE IRON AGE, April 5, 1917, as being manufactured by the Acieral Co. of America, 26 Cortlandt Street, New York, with a plant at Newark, N. J. Some tests of this metal have been made recently by the Bureau of Construction and Repair of the U. S. Navy, with remarkable results. They are as follows and are signed by D. W. Taylor, chief constructor:

Grade of Alloy	Original Area in Sq. In.	Proportional Limit, Lb. Per Sq. In.	Ultimate Strength, Lb. Per Sq. In.	Elongation in $2^{\prime\prime}$ in., Per Cent	Reduction of Area, Per Cent	Modulus of Elasticity, Lb. Per Sq. In.
A . . 0.0498	37,500	51,300	4.6	6.22	10,870,000	
A . . 0.0498	37,000	49,400	2.0	4.62	10,000,000	
B . . 0.0561	34,000	46,900	4.0	18.71	8,854,000	
B . . 0.0561	35,000	45,800	3.1	16.85	8,700,000	
C . . 0.0489	51,000	66,400	1.8	6.81	10,210,000	
C . . 0.0495	51,000	67,600	4.1	7.23	10,640,000	
D . . 0.0500	52,000	71,800	2.0	3.80	10,200,000	
D . . 0.0500	54,000	69,000	2.0	2.80	10,525,000	

These tests represent metal varying from 0.064 and 0.066 in. x 0.755 and 0.7615 in. in diameter, evidently as sheets. In the orginal article the statement was made



The Turning of Carwheel Journals Without Removing the Wheels from the Axles Is Made Possible by a Recently Developed Combination Journal and Axle Lathe in Which the Bed Can Be Drawn Back to Form Gaps to Permit the Mounted Wheels to Clear

clamping of the cap which is counterweighted is provided by one large hinged bolt, and when the cap is swung up it automatically lifts the top half of the main driving gear, an arrangement which it is pointed out facilitates the placing of an axle in the lathe or removing it when the work is finished. Hinged dogs in connection with a double equalizer drive plate are employed to drive the axles. The upper bed members each support a tail stock having a spindle, the adjustment of which is controlled by hand wheels.

Three different arrangements of drive are provided for the lathe. These include a countershaft and step-cone pulley, an adjustable-speed motor and a motor and speed box combination. The same range of speeds, 16 to 48 r.p.m., is secured with all three combinations, but the number of steps available is different for each arrangement. With the cone pulley and countershaft, six speeds are secured by employing a three-step cone pulley and a two-speed countershaft. In the case of the adjustable-speed motor drive, a 15-hp. 220-volt direct-current motor having a speed range of 3 to 1 is mounted on a base plate attached to the left end of the bed. This is geared directly to the driving shaft, thus giving three different speeds to the driving head. The other arrangement of motor drive employs a 15-hp. 220-volt three-phase, 60-cycle motor mounted on a speed box at the left end of the machine and geared

that as sheets when heat-treated this metal had shown a tensile strength of upward of 70,000 lb. per sq. in. One of the above tests bears this out. The alloy is silver white, is made partly in an electric furnace and is offered for structural use in automobiles, airplanes, etc.

The Pacific Coast Steel Co., Portland and Seattle, has announced that it will establish an open hearth furnace and rolling mill at Linnton, near Portland, Ore., which will cost \$500,000. The plant will have 500 employees. The rolling mill and open hearth furnaces will be duplicates of those in the company's other plants, and plant will have capacity of 4,000 tons monthly. Raw material will be provided from scrap iron and the product of the company's blast furnace at Irondale, Wash. Construction of the plant will be in charge of T. S. Clingan, manager of the company. E. M. Wilson, San Francisco, is president.

Puddlers of the Reading Iron Co., Reading, Pa., on May 29 were granted an increase of 90c per ton. The puddlers were getting \$11.60, and now receive \$12.50. The new scale took effect Monday, May 27. This is the largest puddlers' wages ever paid in the Schuylkill valley.

How Ordnance Production Has Gone Forward

Nearly Four Billions Involved in the Contracts of the Past Year—Changes in Organization That Will Give Freedom of Action

WASHINGTON, June 4.—The enormous expansion that has recently taken place in the Ordnance Department has made necessary a number of changes in the organization for the purpose of bringing the bureau into line with the best business and manufacturing practices. The changes do not affect the basic organization of the bureau, but are in the nature of readjustments and elaborations that have been suggested by experience since the general overhauling of the department last fall.

The operations of the largest private establishments in the world become insignificant when compared with the work of the Ordnance Bureau. Estimates of expenditures for the coming fiscal year, including appropriations provided by budget bills already drafted and recommendations submitted to Congress by the Secretary of War, aggregate more than seven billion dollars, and the expenditure of this vast sum must be planned by a single bureau and carried out in detail from the designing of the material to its final use on the battlefields of France. At the present time the Government is procuring war material through the Ordnance Bureau on three different systems; first, by complete manufacture in its own arsenals; second, by purchase from private contractors who finance their own undertakings; third, by procurement from concerns receiving assistance from the Government either in the shape of raw material furnished or funds advanced for the extension of plant and equipment.

Important Changes in Organization

To handle all these intricate transactions and to maintain a steady flow of ordnance material to the seaboard is a task which is constantly being studied by efficiency experts employed by the War Department, as the result of which some important modifications in organization and procedure have just been made. The chief purpose of these changes is to obtain greater freedom of action and increased efficiency in the operating divisions of the Ordnance Department charged with the execution of the ordnance program, by bringing the operating divisions more closely in contact with the acting chief of ordnance. The divisions under the new order are as follows:

(a) The Administration Division.—The name of the General Administration Bureau is changed to that of the Administration Division, without, however, any change in the work with which it is charged, which is administration of finance, personnel, and property; the collection, and dissemination of information other than statistical information, and the maintenance of relations with certain outside agencies.

(b) The Engineering Division.—The name of the Engineering Bureau is changed to that of the Engineering Division. This division is charged with the preparation of designs and specifications of material and the decision as to types to be manufactured. Technical ordnance problems are handled.

(c) The Estimates and Requirements Division.—Charged with the formulation of requirement schedules based upon the man power program dictated by the general staff. This division is also charged with the statistical analysis of the work and progress of the Ordnance Department.

(d) The Procurement Division.—This division is charged with the purchase of all ordnance material, a task which includes the development of facilities for manufacture, as well as the letting of contracts where such facilities already exist.

(e) The Production Division.—Charged with the responsibility for production.

(f) The Inspection Division.—Charged with the responsibility of maintaining quality and uniformity in production.

(g) Supply Division.—To this division is assigned the entire task of storage and distribution of more than 50,000 dif-

ferent articles supplied by the Ordnance Department to the armed forces.

This form of organization places special emphasis upon the importance of production and gives the freest rein to those divisions charged with that responsibility.

A Marvelous Expansion

The enormous expansion of the manufacturing operations of the Government under the Ordnance Bureau since the United States became involved in the war is described in highly interesting detail in a statement presented in the House by Representative Caldwell of New York, which is understood to have been carefully prepared for him by ordnance experts detailed for the purpose. It is the first survey of ordnance production of a comprehensive character that has been made public and brings the operations of the department up to May 1 of this year. In addition, it forecasts the progress that will be made during the organization of the current calendar year in the building of big guns and describes some of the larger projects which will not be completed before the spring of 1920.

When we entered the war, says this statement, our Allies were holding the enemy and had been for a long time depending upon America for supplies in huge quantities and of all kinds. Our entrance would have been a burden if we had turned our industry from making their necessary supplies that they were using to creating the initial supply for our Army that could not be used directly against the enemy for a year. Their needs were, therefore, of first consideration and have been given priority over every need of our army, navy and shipping program.

From a Few Millions to Four Billions

At the beginning of the war the Ordnance Department was conducting a business of \$14,000,000 per annum, employing 97 officers, 700 enlisted men, and almost no civilians. During the past year its business has aggregated nearly \$4,000,000,000 represented by direct appropriations and contracts authorized, or twelve times the total cost of the Panama Canal. To handle this business the Ordnance Department has built up an organization of 5000 officers and more than 20,000 civilian employees. For conducting the work of the department outside of Washington a dozen district offices are maintained throughout the country, the locations being determined by the proximity of the plants manufacturing the most important material.

The question is asked, Why is it that the factories were not ready to produce for us at once in quantity when they had produced such quantities for our Allies before we entered the war? The reason is simply that the items manufactured here for our Allies were really very few in number and the quantity was almost infinitesimal in comparison with the production required now; and the items required by the Allies were in many cases different in size and character from those required by America. In some materials, such as ammunition for the newly adopted French field gun, the previous factory developed has helped; in other cases, as in heavy artillery, it has been a hindrance.

The most important of all things in a soldier's equipment is the rifle. We are equipping all troops now going over with the United States rifle, 1917 modified Enfield. There has never been, even in the very beginning of the war, any serious shortage of rifles or bayonets. In the case of rifles, the plant developed for foreign orders had been large, and at plants and arsenals the Government orders were in

some cases anticipated. In one plant, Winchester, millions of dollars were spent in preparation before an order was placed, even informally.

Rifle Output Ahead of Schedule

At the beginning of the war Springfield rifles, 1903 model, were being produced at the rate of about 10,000 per month. This jumped in September to 20,000. Of the (Enfield rifle) United States 1917 type, which is the accepted type and the type which has proved its worth in actual warfare, the total jumped from 1550 last August to over 12,000 in September, 50,000 in October, 120,000 in November, and finally 200,000 in March. The rifle production is considerably ahead of schedule requirements, and it is expected that the entire requirements for the year will be completed during the coming summer. In bayonets similar conditions occur, the production having kept pace substantially with the rifles.

On the other hand there is still a shortage of pistols. Only two plants were equipped for pistol and revolver output, and it was impractical to change over other plants to increase the capacity earlier in the year, because these plants were needed in the manufacture of the more important rifle. At the present time, however, the Winchester Repeating Arms Co. has progressed so far with its rifle orders that it has taken also a contract for 500,000 pistols. The output is in the neighborhood of 40,000 a month at present and is rapidly increasing. Negotiations have been completed with the Remington company for 500,000. This will not produce the quantity required and other facilities are being developed.

Machine Guns

The output of machine guns is well up to the estimate of production and to the requirements. The Browning machine gun has gone through an exhaustive test, and as a result has been recognized as the best gun in the world. While the actual deliveries of the Browning gun have only just begun, sufficient numbers of other types have been produced to satisfy all of the demands to the present time and up to date when the heavy Browning will be delivered to the troops. We have 2500 Colt, 2500 Lewis, 3400 Hotchkiss and 6600 Vickers, of the heavy type used only in the field. This is in addition to the French Chauchat, large quantities of which have been delivered to us in France.

Of the lighter machine guns used for aircraft work, 16,000 of the Marlin synchronized type have been delivered up to May 1, and 5000 are expected per month. Of the Lewis flexibles 4500 have been delivered; of Vickers, light, 2000; of the light Browning, called automatic rifles, the deliveries were begun in February, and the output through April was 1000, for May 1200, and for June there are expected 4000; and by Dec. 31 the total output of 75,000 is expected. In other words, the requirements of the increased army will be met.

Of the heavy Browning, the schedule requirements for the year called for 26,000, while the estimated deliveries are 48,000. The May deliveries are estimated at 800, while in August 5000 are expected, and in November 13,500. The guns already produced and those obtained from the French have been ample in quantity to supply all of the needs of the troops and will be sufficient until these heavy deliveries are made.

When war was declared we were much impressed with the statement that Germany, after 40 years of preparation, had laid up a reserve supply of over a billion rounds of ammunition. After 40 weeks of preparation the United States had in reserve a supply of 1,187,209,000 rounds of 0.30 cartridges for use interchangeably in rifles and machine guns. This is one item alone.

Artillery and Shells

In the manufacture of artillery ammunition of various types the orders previously produced for England and France have been of some assistance in plant development, although of no great moment, because the foreign orders were relatively small. For the very important pieces of artillery, the 75-mm. field gun, shrapnel can be manufactured in almost any quantity

desired. In January, 125,000 complete rounds were finished, a completed round being a single completed piece of ammunition. About the same number were turned out in February, while in April the output was increased to 900,000 and will be maintained at about this rate. None of this material is yet being shipped, because the French are furnishing all that is required for the present.

The output of 75-mm. high-explosive shell is just beginning; 248,000 rounds were produced in April, 1,000,000 are expected in July, and 2,000,000 rounds in September. There are some 20 contracts for this shell and forgings and some 40 contractors on machining. The reason the output has only just begun is that at the beginning of the war there were practically no machine tools adapted to this work and it was necessary to start at the beginning and build tools to make the machines to finish the shells. It may be of interest to those who are not familiar with the details of ordnance material to know that a single 75-mm. shell has 63 parts; that is, 63 pieces have to be manufactured separately out of different kinds of material; in fact, a single shell is as complicated as a watch to produce and assemble, and almost as delicate.

Some idea of the complexity of the problem thrust upon the manufacturers of the country by the Ordnance Department as a result of our entering the war can be gained from an analysis of the single item of ammunition for small-sized cannon. Among the materials used in such ammunition are steel, copper, lead, tin, brass, bronze, felt, cardboard, paper, calico, and tin foil, in addition to the explosives.

Gun and Tool Situation Requires Speed

It is very encouraging to note the remarkably excellent condition of the vital material which has been discussed. The Ordnance Department, on the other hand, recognizes that the immediate situation in artillery is serious and is endeavoring to expedite the production. So far there has been no shortage. The recent developments in France, however, have been showing more and more the necessity for laying stress on this part of the program.

It is necessary to recognize that big guns cannot be built in a day. Neither can the machines to make the guns nor the machine tools to make the machines to make the guns be built in a day nor a week nor a month, for that matter. The tools necessary to make the lathes on heavy cannon, 10-in. and upward, have to be produced before the lathes themselves can be turned out; and this inevitably takes time. The making of forgings for guns has created an entirely new industry.

One of the most important of the guns at the present time is the 75-mm. field gun; of these, 5589 have been ordered in the United States besides those which are being purchased from the French. This size gun is also used for aircraft work. Some 4000 are expected to be completed during this year. This remarkable capacity has been developed from absolutely nothing a year ago. There is now an ample supply of machines for manufacturing small and medium sizes of artillery, 6-in. and under. There is still shortage in the large machine tools required for turning, boring, pressing and milling, notwithstanding the utmost pressure which is being brought to bear upon manufacturers. This fact, however, does not by any means indicate that we have been backward in production during this period. As a matter of fact, the tool industry was contracted for nearly to its full capacity by England and France. These contracts could not be broken without damaging the cause much more than would have resulted from transferring work to American contracts. These tool contracts are only recently expiring, so that commitments can be taken for the War Department. In other cases the Navy has had priority, which has resulted in a delay for the ordnance, although accelerating the naval production.

At present we are making three models of the 75-mm. field gun, all of which use the same ammunition. But it is intended that the French model of 1917 shall be the standard type used by the American Army in France. It is expected that by Jan. 1, 1919, there will be delivered 1400 of the model of 1916, 640 of the

model of 1917, and 1225 of the French model of 1917, creating a reserve supply of about 1000, besides meeting the estimated requirements of that date. After this time we will also be able to produce the standard type of 75's at the rate of 480 per month, so as to fill the replacement requirements.

We have much difficulty in securing carriages for these guns, but the difficulties are being fast overcome, and it is confidently believed that by Jan. 1, 1919, there will be sufficient deliveries to meet requirements. In the meantime present requirements are being met by oversea purchases and a few 3-in. guns manufactured and shipped from this country.

Forgings a Limiting Factor

The 6-in. seacoast gun we are using for heavier work will soon be supplemented by the 155-mm. gun with a range from 16,000 to 17,000 yd. Orders have been placed for 1449, of which perhaps 400 will be delivered by Jan. 1, 1919, and thereafter at the rate of about 200 per month. The limiting factor in the production of these guns is the forgings. Forgings are on order in six of the largest steel establishments of America, but because of the general lack of knowledge concerning their manufacture there have been killing delays, resulting in very small deliveries.

The 155-mm. howitzer is a shorter gun with a correspondingly shorter range; in other words, a mortar of 155-m. caliber and movable. It is expected that by Jan. 1, 1919, approximately 1500 of these guns will be delivered.

To meet requirements pending the delivery of the howitzers, there is also being manufactured an 8-in. and 9.2-in. howitzer of American design.

The third type of the mobile artillery is the 240-mm. howitzer. The first of these guns will be delivered some time in July, and thereafter the deliveries will increase very rapidly, reaching over 100 per month in November, with their carriages. It is believed that we will have by Jan. 1, 1919, 9237 of all these sizes of cannon, 1202 having been already delivered.

Eleven New Forging Plants

In laying out this program the department has established 11 gun-forging plants and has given large financial aid and much technical assistance. It has been necessary to make the tools with which the machinery could be made, and then to make machinery with which the guns were to be made; and then to build factories, assemble workmen, teach them how to perform their tasks, find the material, and finally to manufacture the guns. In many instances, in addition to these things, houses for the workmen to live in were constructed.

While this program was going on the necessity for heavy ordnance has not been overlooked. We have laid out a program for 8, 10, 12 and 16-in. guns, and 12 and 16-in. howitzers in quantity, many of which have been already supplied from the Coast Defense Service and the Navy, and which are to be replaced under contracts already let. All of these guns will be placed on railroad mounts, the construction of which is a task in itself. The largest of these mounts consists of the rolling stock of two steel flat cars of 100,000 lb. capacity, joined together by bridge work larger than any girder that I have ever seen on any kind of construction. Upon this mount the gun will be placed in such a way that its muzzle may be elevated or lowered. The mount will be carried along the railroad track under power to specially constructed spurs that will be run from the railway track toward the enemy territory. These spurs will have right and left curves, so that the gun may be pointed in any direction required, the recoil having been worked out to a nicety. They will be ready for delivery in the spring of 1920, when it is hoped that they can be used against the German fortifications on the Rhine.

W. L. C.

The Pennsylvania Engineering Works, New Castle, Pa., has purchased 35 acres for plant expansions.

AGAWAM LAUNCHED

Fabricated Ship Christened—Mr. Schwab Announces Plant Extensions

The first of the fabricated ships contracted for by the Emergency Fleet Corporation to leave the ways was launched at the shipyard of the Submarine Boat Corporation at Port Newark Terminal, N. J., Thursday, May 30. Fabricated ships have been built for some time past at the yard of the Chester Shipbuilding Co., Chester, Pa., but this ship, named the Agawam by Mrs. Wilson, wife of the President, is the first of the large program of ship construction on the fabricated plan, which has been inaugurated. Other yards building fabricated ships which will have launchings soon are the American International Shipbuilding Corporation, Hog Island, Pa., and the Merchant Shipbuilding Corporation, Bristol, Pa.

Among those who watched the launching of the Agawam, a 3500-ton vessel, were Charles M. Schwab, director general of the Emergency Fleet Corporation; Thomas A. Edison; Henry R. Carse, president of the Submarine Boat Corporation; H. R. Sutphen, vice-president of the corporation; A. C. Pessano, head of the Great Lakes Engineering Works, Detroit, and many others. Mr. Schwab and Mr. Carse made addresses to the crowd.

While this launching was going on President Wilson drove the first rivet in the keel of a ship laid on the ways of the Virginia Shipbuilding Corporation, Alexandria, Va., and the Merrill-Stevens Shipbuilding Corporation, Jacksonville, Fla., launched the first of the composite ships, made of steel and wood.

Mr. Schwab has announced the construction of new plants to produce turbines. He said also that the construction of one or more large fabricating plants to aid in producing sections for ships is contemplated. The turbine plant of the Westinghouse Electric & Mfg. Co. at Lester, Pa., would be enlarged about 40 per cent, Mr. Schwab said.

War Chest Fund Support from Industrial Philadelphia Interests

Industrial concerns at Philadelphia have been active in support of the War Chest Fund developed by the city to provide for war relief work as approved by the United States Government, and eliminating the necessary drives for contributions to the selected national agencies carrying on this work. The subscriptions are voluntary and are arranged along a quota plan for entire equity. Among the industrial companies contributing to the fund are: The Baldwin Locomotive Works, \$300,000; William Cramps & Sons Ships & Engine Building Co., \$120,000; Midvale Steel Co., \$100,000; Midvale Steel & Ordnance Co., \$15,000; Cambria Steel Co., \$32,500; E. J. Lavino & Co., \$50,000; William Sellers & Co., \$6,000; Niles-Bement-Pond Co., Philadelphia works, \$5,000; Belmont Iron Works, \$15,000, and officers, office force and draftsmen of the company, \$12,000; Ajax Metal Co., \$10,000; Baldwin Locomotive Works, employees, \$315,000; Electric Storage Battery Co., \$50,000.

Among the concerns with a 100 per cent record for subscriptions from employees are the Aetna Foundry Co., Cresson & Morris Co., American Radiator Co., Earle Gear Machine Co., Borden Stove Co., United States Radiator Corporation, Harrison Safety Boiler Works, Widerman Machine Co., Standard Steel Works, Ivins Tube Works, Keystone Screw Co., Hoopes & Townsend, Schaeffer Machine Works, and Goldner Boiler Works.

Industrial plants in the Youngstown, Ohio, district are asking their employees to take a pledge that they will exert their best efforts to increase production and make possible delivery of the largest possible quantity of steel in their departments needed for war purposes. All the steel mills in the Mahoning Valley are working principally on Government orders.

Triplex Process of Making Electric Steel*

The World's Largest Plant—Electric Rails Compared with Others—Output Past and Present and an Estimate of the Outlook

BY THEODORE W. ROBINSON

IT is a far cry from Benjamin Franklin, expounding American democracy in the court of France, to the maintenance of American ideals on the battle-fields of Europe—yet the enlightening power of Franklin's statesmanship promises to pale into insignificance before the compelling force of the guns that are being produced through his genius in electrical discovery. Electric steel has played no unimportant part in the paths of peace. It is about to play a more important part in the theater of war.

This paper has to do with the triplex process of producing electric steel as carried out at the South Chicago works of the Illinois Steel Co. In the following survey, it has been the aim to leave the description of the physical features of the plant largely

to illustrations and drawings, and to confine process reference to its most salient points. The technicalities of general plant design and operation of the electric furnace have been ably presented before this Institute by W. R. Walker, Dr. John A. Mathews, and others. The object of this paper will have been achieved if with a minimum of repetition, it

supplements existing records with later developments, especially in connection with the manufacture of electric steel in relatively large quantities.

The development of electric steel at South Chicago was based upon the fundamental conception that the electric furnace was pre-eminently adapted to the manufacture of carbon and alloy steel of the highest quality, that it would be possible to produce electric steel in sufficiently large units to permit its use in heavy products, and that the increas-

ing demand for high-grade steel would provide a sufficiently extensive market to make its manufacture commercially possible.

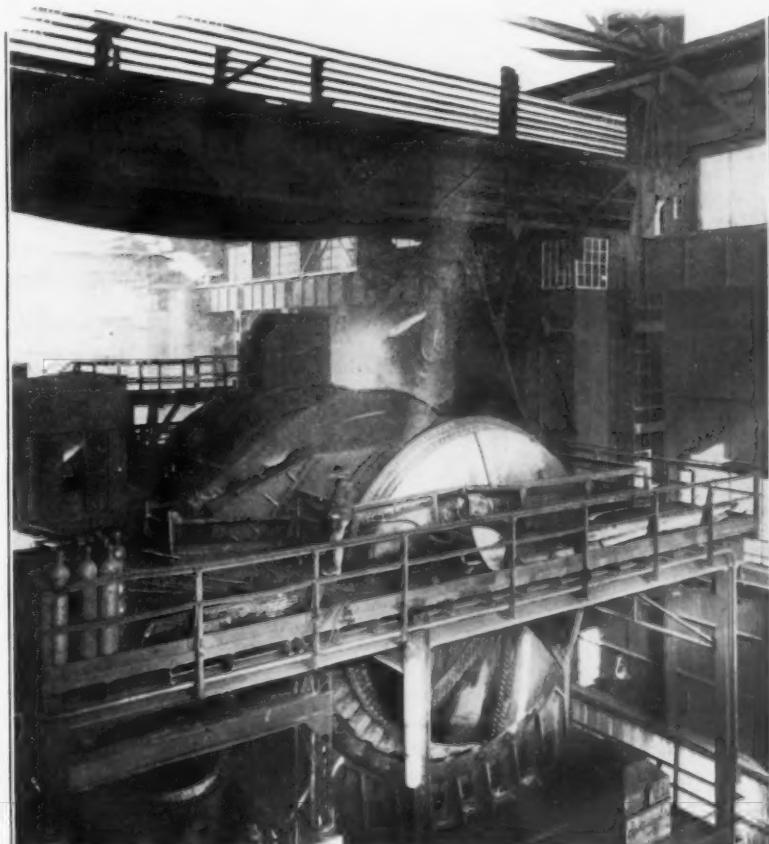
Under these promises, the Illinois Steel Co., in May, 1909, installed its first electric steel furnaces at the South Chicago works. At that time there were only two other electric furnaces in this country concerned with the manufacture of electric steel—one at the Halcomb Steel Co., Syracuse, N. Y., and the other at the Firth Sterling Steel Co., McKeesport, Pa. The furnaces here and abroad were all small, running from a ton or less to five tons in capacity. Our installation consisted of a 15-ton basic-lined Heroult furnace with an electric equipment for 3-phase, 25-cycle, and 100-ton volt current. The manufacture of electric steel was a new art and ours was a new adaptation of a new art. As to the troubles we encountered, I may say their name was "Legion." Perseverance conquered, however, and we soon had the satisfaction of producing a metal of unquestionably superior quality.

Electric Steel Rails and Others

As the fundamental object was to demonstrate the opportunities of the new process in connection with heavy products, attention was early turned to the experimental manufacture of electric steel rails. Under the limitation of equipment, it was necessary to depart from standard rail practice to the extent of accumulating cold ingots and re-heating them. The electric steel used was made from Bessemer blown metal. We advisedly felt our way in chemistry. Irregularities incident to incomplete equipment were

unavoidable. In spite of pioneering difficulties, about 10,500 tons of electric steel rail were laid on 14 railroads throughout the country. The result of these rails in track indicated that electric and open-hearth rails of like chemical composition had practically the same resistance to wear when the former were made under the conditions that existed at the time of their manufacture. The failure from breakage was almost negligible, there were no interior defects and the tests showed that the electric steel was considerably more ductile at low temperature than either the open-hearth or the Bessemer steel.

In order to



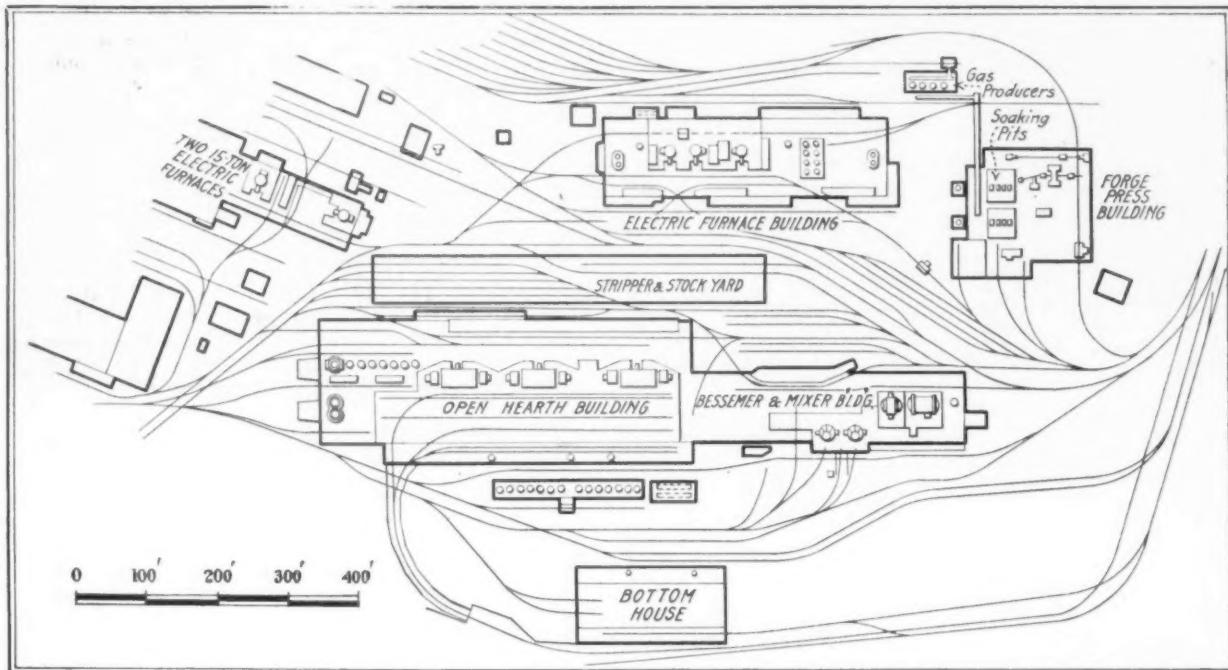
Pouring Pig Iron into the 1300-Ton Mixer at the Illinois Steel Co.'s Triplexing Plant

*Paper presented at the fourteenth general meeting of the American Iron and Steel Institute in New York, May 31, 1918. The author is first vice-president of the Illinois Steel Co.

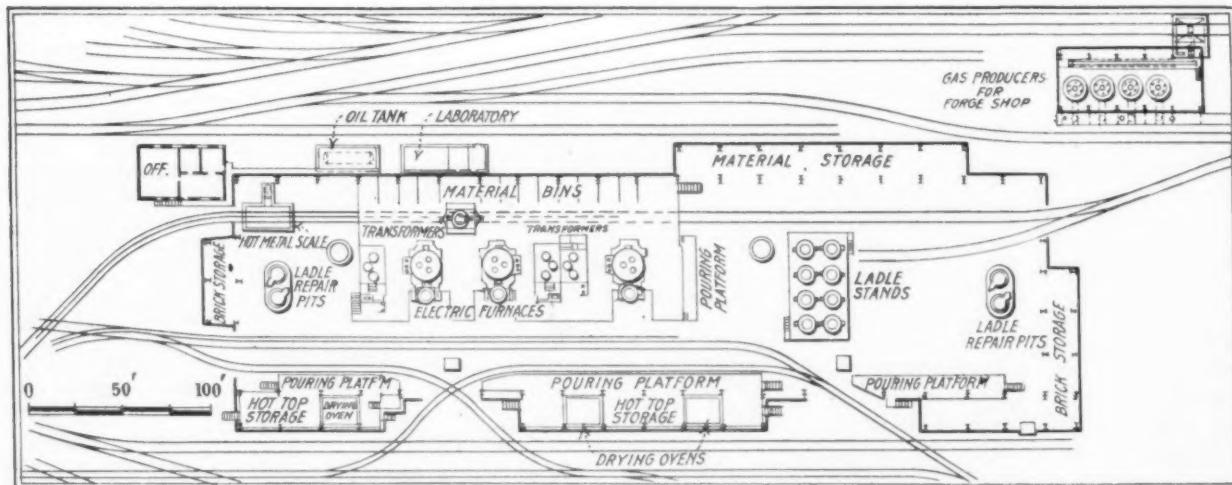
further determine the facts, a series of experiments was undertaken with a view of testing the ductility of rail steel at low temperatures. A refrigerating plant was erected adjacent to our regular drop-testing machine. About 900 pieces of electric, open-hearth, and Bessemer rails of various sections were tested at temperatures ranging from 70 deg. Fahr. to 50 deg. below zero. These tests emphasized that, in the case of all the steels, there was a marked decrease in resistance to shock as the temperature lowered. Relatively speaking, however, the electric steel was distinctly more ductile than either the Bessemer or open-hearth. The following summary from two electric and two open-hearth heats of similar analysis involving 242

of both open-hearth and electric steels and that electric steel is tougher than open-hearth steel at low temperatures.

During and after the period in which we were manufacturing electric steel rails, we were experimenting with such other heavy products as forgings, plates, axles, and structural shapes. Not only had carbon steel been made in relatively large quantities in connection with these products, but the field of alloy steel had been comprehensively entered. Expanding demand led to the introduction in July, 1916, of a second furnace, similar to the original one in electrical equipment and capacity. This gave a combined capacity of about 4500 tons of electric steel ingots per month.



The Triplexing Plant of the Illinois Steel Co., South Chicago



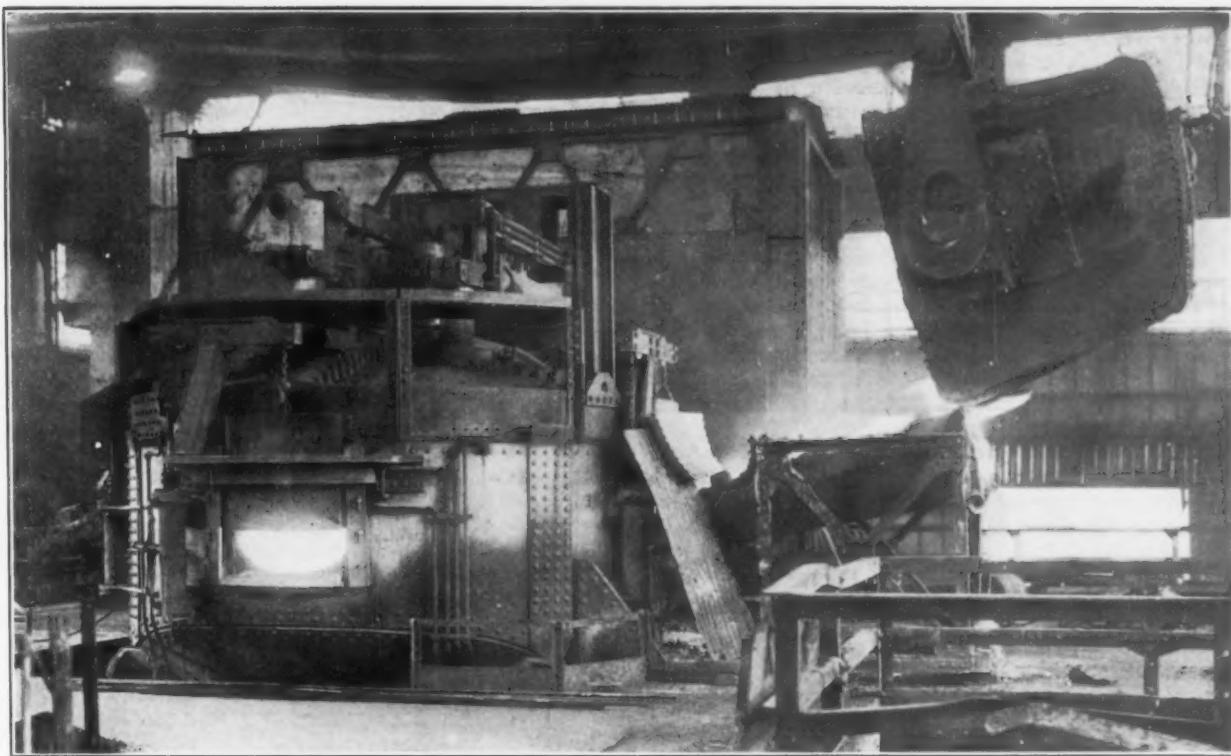
The Electric Furnace Department of the Triplexing Plant

tests is typical of the general results obtained. The figures given in Tables 2, 3 and 4 are average results. The chemical composition of the heats is given in Table 1.

In all these tests the height of drop was kept comparative. At normal temperatures 18 ft. was employed. At zero Fahrenheit and below, the steel weakened by the cold could not withstand so heavy a blow, and the drop was reduced to 8 ft. While it is self-evident that the number of heats involved in the above tables is entirely too small to permit the drawing of definite conclusions, the fact that the other drop tests and the result of the rails in track all pointed in the same direction warrants the belief that the resistance to dynamic force rapidly decreases with lower temperature in the case

By this time our experience had verified in a large measure the soundness of the views upon which our original electric furnace installation was predicated. We had demonstrated that it was possible to produce electric steel in relatively large units without the sacrifice of quality. The physical characteristics of the steel had proved to be admirably adapted for heavy products. There was a growing demand for a superior steel for general purposes, and the call for alloy steels was rapidly increasing in connection with the automobile and other industries. Extent of market was largely a question of price, and price logically was largely a matter of cost.

In the meantime an addition to our open-hearth at South Works had become desirable and in connection



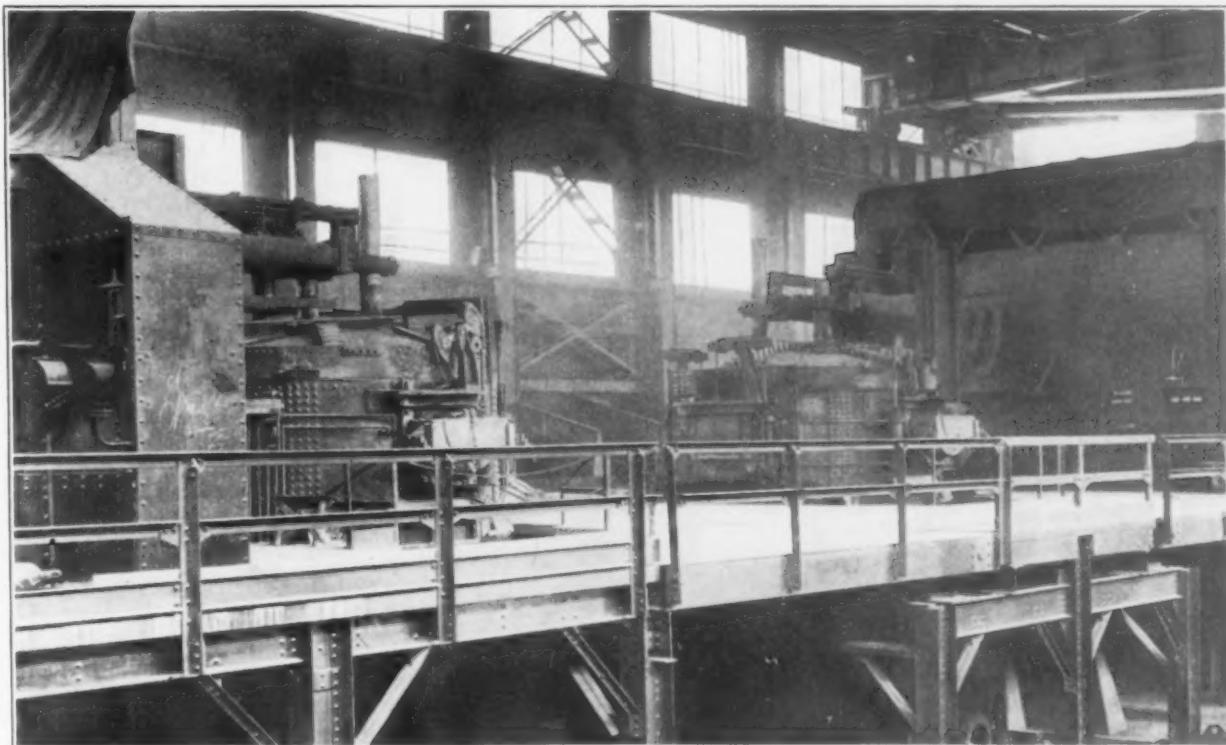
Pouring Open-Hearth Metal Into One of the 25-Ton Heroult Electric Furnaces

therewith the matter of increasing our electric steel capacity was taken under consideration. In studying this subject, we were naturally guided by our past experience. We had made electric steel by the melting of cold stock. We had refined in the electric furnace both molten blown Bessemer metal and molten open-hearth metal. We also had made steel by the initial refining of Bessemer blown metal in the open-hearth, supplemented by final refining in the electric furnace. Part of this work was experimental in character. None of it was done under ideal economic conditions. The cost of producing steel in the electric furnace was vitally influenced of course by the amount of power used, and this and other conversion items were in turn largely influenced by the tonnage produced. Manifestly nothing could be considered that would sacrifice quality for out-

put without destroying the very essence and reason for the electric process.

As electricity is an expensive metallurgical fuel, the melting of cold stock or the preliminary refining of metal in the electric furnace could be accomplished only at the expense of a comparatively high fuel cost. Our original practice was to make electric steel by refining Bessemer blown metal. This process necessitated two distinct operations in the electric furnace, namely, dephosphorization by the use of an oxidizing slag, and deoxidization by means of a reducing slag. Steel of the highest quality can be produced by this practice, but there is obviously greater liability to irregularity in this method than when open-hearth metal is used from which the phosphorus previously has been eliminated.

It is well to remember that the electric furnace, while



Two of the Three 25-Ton Heroult Electric Furnaces

a highly efficient instrument, is far from fool-proof. Several years' experience with the use of Bessemer blown metal in the stationary open-hearth furnaces under the local conditions that existed had helped to demonstrate the advantages of the duplex process for producing open-hearth steel. It likewise had been shown that electric steel could be most advantageously produced at South Chicago by the use of open-hearth metal.

It was essential that the proposed plant should be so designed as to provide not only Bessemer metal for open-hearth refining and open-hearth metal for electric refining, but Bessemer ingots and open-hearth ingots as well. Many new problems were involved. It was clear that for the simultaneous production of Bessemer, open-hearth and electric steel, extreme elasticity of operation was fundamental if efficiency was to be attained. Close assembly of the various units was essential for rapid and economical practice. The sequence of operation had to be unobstructed. A supply of hot pig metal and preliminary refined molten steel must be provided. The plant as finally designed, both in respect to its general plant location and its general details of construction, is shown by illustrations.

Inasmuch as this paper deals specifically with electric steel, no attempt will be made to give a detailed description of the Bessemer and open-hearth refining as carried out in the new plant at South Chicago. The

and are so constructed as to be heated either with producer gas or with tar. Air chambers having 10,472 cu. ft. of checker volume and gas chambers having 6734 cu. ft. of checker volume provide liberal regenerative capacity. Two low-type 7½-ton charging machines and three 100-ton overhead cranes assure the rapid handling of material. The pit side of the open-hearth department, which is generous in its dimensions, is served by two 175-ton cranes, and is provided with a 330-ft. pouring platform capable of handling two sets of molds.

The Bessemer plant is designed for the ultimate addition of a third vessel. Its present capacity may be conservatively placed at 75,000 tons per month of blown metal, Bessemer ingots or any desired combination of the two. The three tilting open-hearth furnaces when operating on blown metal are rated at 65,000 to 75,000 tons per month. The elasticity of their operation is self-evident, and it is obvious that their actual tonnage is dependent upon the character of the charge used. At the present time two of these furnaces are running on open-hearth material, with Bessemer blown metal as a base. The other furnace is operating on a nickel steel scrap charge with molten pig iron additions for further refining in the electric furnace.

In transferring open-hearth metal to the electric furnaces, it is the aim to have the metal slightly lower in carbon and manganese than the specifications under which the electric steel is to be made. There is of course oftentimes a wide range in the specifications under which the electric furnaces are operating, involving high and low carbon and various alloy steels.

The New Electric Plant

The new electric plant contains three 25-ton Heroult furnaces, each with an adjacent transformer building. The general design and dimensions are shown by one of the illustrations. The capacity of the plant naturally is somewhat dependent upon the character of the steel made, but may be placed approximately at 12,000 tons per month. This with the output of the two old furnaces gives a total electric steel capacity of 16,000 to 17,000 tons per month, and makes the South Chicago works the world's largest electric steel producing plant.

The advancement in the design and operation of electric furnaces has not necessitated any radical change in the original electrical scheme as a whole. Such improvements as have been made have been rather in the nature of refinement than essential change. In the case of the large electric furnaces, it is more necessary than in the small furnace to consider the losses due to reactance in the electrical current. When we consider the relatively little power required by the original furnaces, it is evident that in the case of our larger furnaces which are equipped with transformers of 3750 kva. capacity, the question of power losses is an important one. In respect to the electric furnace load from the central station standpoint, it is interesting to note that with four furnaces operating on the triplex process, 24-hr. load factors of 75 or 80 per cent are not unusual. This compares favorably with other forms of industrial load.

In our practice, the furnaces ordinarily are operated with only a reducing slag, and care is taken at all times to see that such conditions obtain as will most thoroughly and quickly effect complete deoxidation. After the steel is thoroughly dead-melted and the reactions are complete as determined by the careful testing of the slag and metal, the current is reduced until a proper pouring temperature is obtained.

Pyrometric Control of Temperatures

The pouring of steel from the electric furnace is subject at all times to the careful control of pyrometric observation. For the production of a satisfactory steel, a proper casting temperature is an important element in all processes, but with the electric furnace special care is needed, partially because of the high heats obtainable with the electric arc. Electric steel on account of its freedom from gases is specifically a dense steel, and in metal of this character the pipe tends to be exaggerated. It is our custom to teem all electric steel in inverted molds with refractory hot tops. As a result, little difficulty is encountered either with the piping as usually found in the ordinary ingot.

Table 1.—Composition of the Rail Steels

	Carbon, Per Cent	Manganese, Per Cent	Phosphorus, Per Cent	Sulphur, Per Cent	Silicon, Per Cent
First electric heat	0.64	0.60	0.024	0.019	0.216
First open-hearth heat	0.62	0.71	0.020	0.040	0.140
Second electric heat	0.73	0.90	0.022	0.043	0.256
Second open-hearth heat	0.72	0.88	0.035	0.033	0.200

Table 2.—Average Number of Blows Required to Break the Rails

Temperature	Electric	Open-Hearth	Comparison
* +60 deg. F.	3.48	3.64	O. H. 5% over Elect.
0 deg. F.	4.41	3.82	Elect. 15% over O. H.
-30 deg. F.	4.55	2.24	Elect. 103% over O. H.
-40 deg. F.	3.31	2.03	Elect. 65% over O. H.

Table 3.—Deflection Before Breaking Blow.

Temperature	Electric	Open-Hearth	Comparison
* +60 deg. F.	2.96 in.	3.36 in.	O. H. 14% over Elect.
0 deg. F.	1.41 in.	1.23 in.	Elect. 15% over O. H.
-30 deg. F.	1.46 in.	0.58 in.	Elect. 152% over O. H.
-40 deg. F.	0.91 in.	0.43 in.	Elect. 112% over O. H.

Table 4.—Elongation in 12 Inches Measured After Last Blow Before the Destruction.

Temperature	Electric	Open-Hearth	Comparison
* +60 deg. F.	0.808 in.	0.929 in.	O. H. 15% over Elect.
0 deg. F.	0.404 in.	0.397 in.	Elect. 2% over O. H.
-30 deg. F.	0.420 in.	0.201 in.	Elect. 109% over O. H.
-40 deg. F.	0.297 in.	0.141 in.	Elect. 111% over O. H.
* 60 deg. F.—18 ft. drop. Zero deg. F. and below—8 ft. drop.			

metallurgy and physical manipulation present little that is novel, and the principles of the duplex process as such are well understood.

The Duplexing and Triplexing Plants

There are two main buildings; one comprising the duplex plant proper, and the other, parallel thereto, containing the electric furnaces. As an adjunct to the latter, there was installed a 1500-ton forge press. In its essential features, the duplex plant consists of two mixers, one of 100 tons and one of 300 tons capacity; two 25-ton acid-lined converters, and three 250-ton tilting open-hearth furnaces. The mixers are commanded by two cranes, one of 100-tons and one of 75-tons capacity, and the mixer metal is transferred on an elevated platform to the converters by a 25-ton transfer ladle operated by cable and winch mechanism.

When used in the open-hearth furnaces, two heats of Bessemer blown metal are poured into a 65-ton ladle commanded by a narrow-gage locomotive. Elimination of slag is accomplished by nozzle pouring into a second ladle. When Bessemer ingots are to be produced, the metal from one vessel is poured into a smaller ladle and transferred to the Bessemer pouring platform. The three tilting open-hearth furnaces, each of which has a hearth area of 892 sq. ft., are electrically operated,

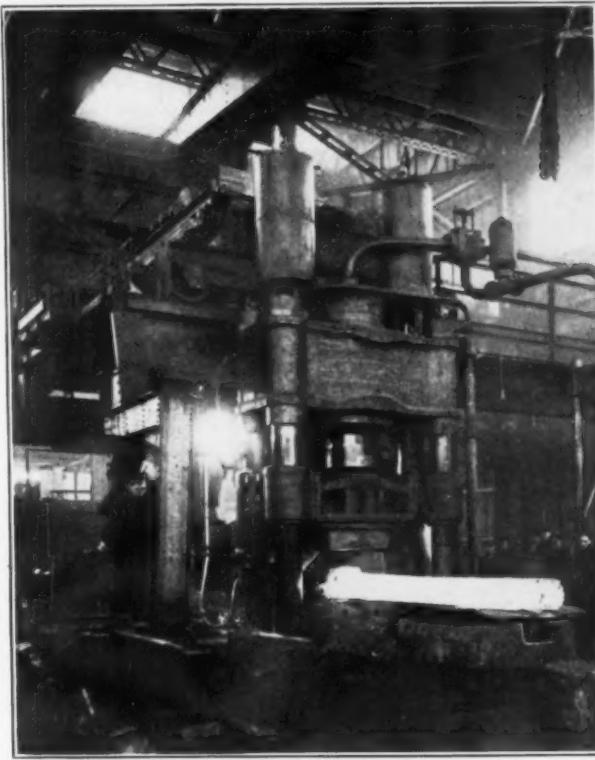
As to alloy steels, it is very necessary to guard against any condition that will unduly tend to unequal ingot strains and special precautions are taken to avoid undue surface tension in the molds. We are now casting ingots weighing from 3400 lb. to 38,000 lb., the uniform solidification of which is made the subject of the greatest care. Top pouring, box pouring and bottom pouring are resorted to, as the individual character of the steel best appears to warrant, and the entraining and inclusion of slag or other foreign matter is carefully guarded against.

To one familiar merely with the casting methods in vogue with ordinary open-hearth or Bessemer steel, the pit practice incident to the proper manufacture of electric steel is something of a revelation. In the subsequent work to which the ingot is subjected, whether in the forge or in the rolling mill, special precautions are taken in the heating, in the reduction of the metal and in the cooling of the product. Ordinary mill practice will by no means suffice if proper results are to be obtained, especially when alloy steels are concerned. Steel which may be innately of the highest quality when tapped in the ladle may readily retrograde or become

in the smaller and perhaps more ephemeral installations, electric steel is to-day, and probably will be in the future, largely produced by a duplex or triplex process whereby, strictly speaking, steel is electrically refined rather than electrically made.

Electric Steel Not An Exact Science

The manufacture of steel is far from being an exact science. It is an art founded upon scientific principles and to a degree subject to scientific control. But there is much in the metallurgy of steel that bespeaks ignorance instead of knowledge, uncertainty instead of definite determination. It logically follows that one should not be dogmatic in passing upon the respective qualities of steel made by different processes. As measured by customary chemical and physical standards, it is possible to show that steel made by the Bessemer process is at times equal in quality to that made by the open-hearth, and steel made by the open-hearth is equivalent to that made in the crucible. By the same token, it may not be difficult to show that steel made by the open-hearth process is as good as that made in the electric furnace. Certainly some of our laboratory results,

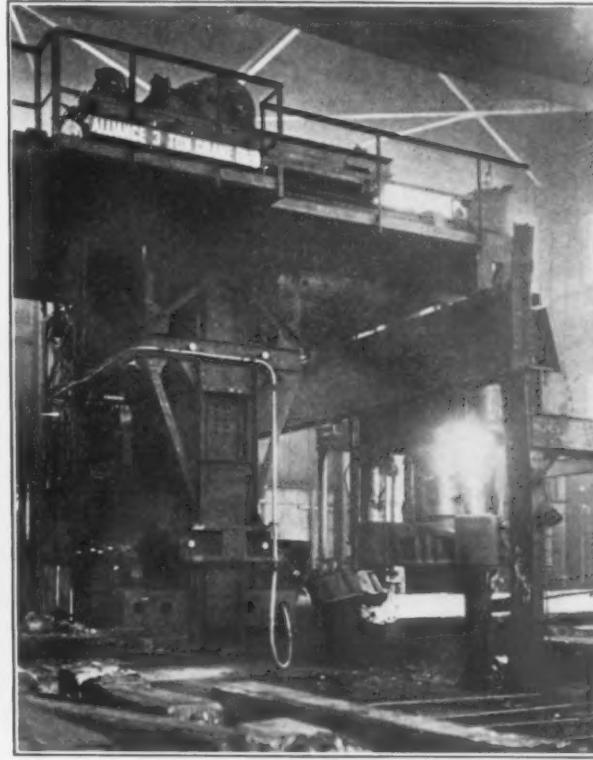


The 1500-Ton Forge Press Adjacent to the Electric Furnace

unfit unless there is exercised extreme care in its later manipulation. Quality is peculiarly the *sine qua non* of electric steel and the price of success is eternal vigilance.

There is of course nothing occult nor mysterious in the electric method, although there is more or less misconception concerning the production of electric steel. The electric furnace when used for the manufacture of steel may be likened to a large crucible heated from within instead of from without by the electric arc. It is capable of performing not only the functions of the open-hearth but very largely those of the crucible as well. Its superiority lies in the rare purity of the heat derived from the electric current and in the peculiar slag control that can be commended in a neutral atmosphere.

Both the Bessemer and the open-hearth processes are distinct in their physical and metallurgical character. The electric process may likewise be considered as distinct when concerned with the manufacture of steel directly from cold metal. When, however, it is used to finish metal which previously has been made in the Bessemer or open-hearth, it may be considered as supplementary to standard methods rather than as an independent process. Other than as manufactured



The Mechanical Manipulator of the 1500-Ton Forge Press

upon which we ordinarily depend for metallurgical guidance and control, warrant such an assertion.

But just here science, paradoxically speaking, proves unscientific and the laboratory oft-times does not square with the results in the field. We all know that, irrespective of laboratory tests, the final verdict of result in service has already clearly established the superiority of open-hearth steel as compared with Bessemer, and the superiority of crucible in its own particular field as compared with open-hearth.

In the last analysis, the characteristics of any metal must be determined by the composite testimony of practical experience. It perhaps may be argued that as so determined, the verdict in respect to steel made in the electric furnace is still an open one because of its comparative youth. Nevertheless, the result of 10 years' experience here and abroad, strongly points to electric steel being in its natural qualities equal to crucible steel, and superior to the steel ordinarily made in the open-hearth. As bearing upon this, the testimony of our honorary and honored member, Dr. H. M. Howe, as recorded in his "Classical Metallurgy of Steel" is of interest. Dr. Howe states:

It is not easy to see why crucible should be better than Bessemer and open-hearth steel of like composition.

Whatever be the reason, there seems to be but little doubt that crucible steel is better than Bessemer and open-hearth steel of like composition as actually made. . . . The belief in the superiority of crucible steel of like composition rests rather on general observation than on conclusive direct evidence and it must be confessed that the quality of much of this evidence is not of the best. This, however, from the nature of the case is almost unavoidable but the quantity of evidence goes far to make up for its quality.

A Word As to the Future

And now a word as to the future: I am not unmindful that "a prophet is not without honor save in his own country." Moreover, human limitation and the kaleidoscopic changes of the past make one hesitate to forecast the metallurgy of steel. While ours is the age of steel, it has been given to men here present to see the passing of the age of iron. The crucible is hoary in its antiquity. The converter a short generation ago was but a conception in the mind of a man whom many of us know personally and the open-hearth as an essential factor is even more striking in its adolescence.

It behooves one, therefore, to be conservative in his prognostication. Forty years ago this country produced but little over a half million tons of steel, 90 per cent of which was made by the Bessemer process. Last year we made 43,000,000 tons of steel, and to the open-hearth 75 per cent is to be accredited. While our production of Bessemer steel has remained nearly stationary since 1906, when it reached its zenith with an output of 12,250,000 tons, the open-hearth has rapidly forged ahead, and last year it accomplished over 32,000,000 tons.

The marvelous development in Bessemer steel was due both to its superiority for general purposes as compared with wrought iron and to its relative cheapness of production. The more recent expansion of open-hearth is attributable, not alone to changing ore conditions and to the lower cost incident to modern construction, but to the increasing demand for a higher quality of steel. The passing of the Bessemer plate and the Bessemer beam and channel was only a prelude to the replacement of the Bessemer rail by its open-hearth rival. It is true that steel made by the Bessemer process is admirably adapted to certain products and for many years to come will play an important part in the metallurgical economies of our nation, but the glory of the converter has definitely paled before the more enduring reliability of the open-hearth. In the earlier stages of our steel manufacture tonnage, as an essential element of cost, was a dominant consideration. Neither the mill nor the consumer attempted more than a general differentiation as to the character of the product. It was largely a matter of quantity and price. Now quality stands first and, while tonnage has gone on apace, volume has become more and more subordinate to character of production.

What does this increasing demand for higher quality portend for electric steel? How much is history to repeat itself in connection with the new process? It is clear that the lower the cost of production, the greater will be the field presented, and much will depend upon the ironmaster's ability to reduce the cost of electric refining to a minimum. When we realize the economies that have been commanded with the open-hearth furnace during the last 20 years, it perhaps is not unreasonable to anticipate that much may be accomplished along similar lines with the electric furnace. There appears to be no reason why electric furnaces larger than those already installed cannot be built. Cost should be inverse to tonnage and high quality is not incompatible with large production.

Past and Present Output

If one is intelligently to read the future, he must take into consideration both statistics and psychology. The annual statistical report of the American Iron and Steel Institute first separately classified electric steel in 1909, with a production of 13,762 tons. Last year this country produced 234,000 tons, which is more steel than was made annually in all our open-hearth furnaces 30 years ago. The output of electric steel this year undoubtedly will be much greater. We are now producing at the South Chicago plant at the rate of 140,000 tons

per year, and we shall shortly be producing at the rate of 200,000 tons per year. Our country is growing rapidly, and the per capita consumption of steel is growing even more rapidly. In 1900, our population was approximately 76,000,000, and each of our inhabitants represented an annual consumption of 280 lb. of steel. In 1916, our population had reached 103,000,000, and our annual consumption of steel had increased nearly three-fold, to 820 lb per capita. These figures do not include our exports of nearly 5,250,000 tons made that year. So much for statistics.

As for psychology, we should not forget that the luxury of to-day is the necessity of to-morrow, and that emulation is a powerful creative force. Bessemer steel was eminently satisfactory until the superior quality of open-hearth metal relegated it to a subordinate class. And now comes electric steel with a still higher standard. Safety cannot be measured by price and public opinion will more and more insistently call for the highest excellence in the automobile, the airplane and other forms of fabricated material.

Forty years ago Sir Williams Siemens dreamed of making electricity the handmaiden of the metallurgical art, and through his efforts his dream was realized in the birth of electrometallurgy. Twenty years later, Heroult visualized the dominance of electrometallurgy in the realm of steel. Whatever the future may have in store, let us remember that progress waits upon vision and vision, even though it resolves for the moment into a mirage of shattered hope, often is ultimately translated into accomplishment.

Discussion by Dr. Howe

Dr. Henry M. Howe, in briefly discussing Mr. Robinson's paper, said that there is really no satisfactory explanation why crucible steel is better than open-hearth and Bessemer. Perhaps it is due to the exclusion of oxygen. It is certain that there exists a better control of melting conditions than in either the Bessemer open-hearth.

The same reasoning may apply to the electric steel process. The conditions are almost identical with those of the crucible. It is easier to believe this than to accept evidences of experimentation. In the open-hearth process you have such atmosphere and slag as you can get; in the crucible and electric you have such atmosphere and slag conditions as you desire.

One cannot now entirely forecast the role that the electric furnace is to play. It will have an important part in producing alloy steels. It will have a great part in the finishing of Bessemer and open-hearth steels. The old simile is appropriate here; that if you have very dirty linen to wash, the first step may be to treat it with water that is turbid or partly dirty but the final touch is only obtainable with pure clean water. The electric furnace is the agent to give the final touch to less pure steels.

Quantity of output has been the first consideration but we are fast realizing that cost is secondary and that quality is more and more a necessity. The best possible protection is vital for ship armor, for gun steel or even for rails. Loads on railroads are now enormous and may increase in the future. The best resistance in rails is absolutely necessary. Looking ahead we come to the conclusion that electric steel will have a wide use wherever producible in large quantities and especially so in rails.

Discussion by Dr. John A. Mathews*

To those of us who have been following the subject for 15 years or longer it [the triplexing plant at South Chicago] is much more wonderful than anything we dreamed of or contemplated in the early days of the electric process. If the inventors foresaw such developments and disclosed their visions to us, we discounted them and attributed their optimism to the characteristic enthusiasm of inventors.

In the introduction of electric steels for several years when we were alone in the field, we would have been more successful had we not been alone. It was hard enough to convince users of the superior quality

*President Halcomb Steel Co., Syracuse, N. Y.

of such steel in the early days and still harder to get makers of open-hearth steels to admit it and it is certainly refreshing when a man so well informed as Mr. Robinson concerning the merits and limitations of Bessemer and open-hearth steels, comes out in an unqualified way to endorse what we have contended for many years.

Ductility at Low Temperatures

The data submitted as to relative ductility at very low temperatures is instructive and may not be without practical application in connection with aeroplane steels which are frequently subjected to a combination of low temperature, vibration and shock in use that will tax the best materials. Light field or body armor that will withstand the ballistic test at normal temperatures may fail in intense cold. From a close connection with the preparation of specifications for materials for such purposes, in the past year, I do not feel that these finer points have received adequate attention.

Two years ago I said: "Not only in automobiles and aeroplanes, but in many other ways, electric steel will give a good account of itself for military and naval purposes." We can now say that it has done so. I know it as regards our own products and I have it directly from those in a position to know about the products of the Illinois Steel Co. and of other firms. We have an electric furnace productive capacity in the United States that could take care of the entire requirements of the aviation and body armor programs, and leave some over for trucks, gun parts and other exacting needs of the Government.

The combination of Bessemer, open-hearth and electric has been called the "triplex" process, while the early use of open-hearth and electric, as practiced by us, is a duplex process just as truly as that of Bessemer and open-hearth to which the term is generally applied. Contradictory as it may seem, I think that the apparently simple method of direct cold melting and refining in the electric furnace might be called the "complex" process, for I believe that making consistently uniform, well-melted steel direct from low grade scrap, with the use of two slags, requires greater metallurgical skill and persistent care than are required by either process where a liquid base and only one slag are employed.

The very high load factor, reported in the paper under discussion is quite remarkable and I should like to ask the author if his figure is based upon connected load or upon a peak load basis. Upon the latter basis we have not been able to equal this load factor.

Over 40 years ago Sir William Siemens stated that the function of electric melting is to "effect such reactions and decompositions as require for their accomplishment an intense degree of heat, coupled with freedom from such disturbing influences as are inseparable from a furnace worked by the combustion of carbonaceous materials."

Savings in Alloy Additions

Several results follow because of this which are of vital importance just now. Easily oxidizable metals like vanadium, chromium and manganese are readily handled and hence less of them need be used to give a final minimum content in the steel. Also, there will be less of the oxides of these metals produced in the steel and to be removed from the steel. Sulphur and phosphorus can be readily eliminated and it is obvious, if they are essentially absent, they cannot segregate. Therefore, cropping may be reduced and yield increased—practical conservation! Alloy additions may be made in the furnace rather than in the ladle thereby increasing solution, diffusion and homogeneity.

All of these considerations make for quality when quality is the first consideration and, beside, the electric furnace performs an economic function from its adaptability for handling and recovering alloy values. With the chromium and manganese situation as it is, this ought not to be overlooked. Some alloy scrap is not a desirable addition to open-hearth furnaces or, if made, a large share of the alloy is lost in the slag.

It is highly desirable just now that no alloy material be lost.

Hydroelectricity and the Future

One more economic consideration may be mentioned. With wise State and National policies affecting hydroelectric developments, we may see a great electric steel industry develop without impairment of coal reserves. There are indications that the Government is taking a more enlightened view in regard to developing or permitting the development of those great and inexhaustible natural sources of power—the waterfalls. When such developments are accomplished the electric furnace will utilize power which, once over the falls, is gone forever, to reclaim materials that in fuel-fired furnaces are irretrievably lost, and produce the maximum yield of particularly sound steels necessary to the advancing demands of war and of the longed-for peace.

Brazil to Aid Steel Industry

Aid is to be given the establishment of a steel industry in Brazil, according to a decree issued by the Brazilian Government on March 30, 1918. It provides that companies actually producing iron in Brazil, mining the ore and smelting it with charcoal, and those which within three years from the date of the decree begin the manufacture of iron and steel, using charcoal, coke, electric smelters or other similar devices, may receive loans from the Federal Government to the extent of the cost of the plants, the Government taking a mortgage on the property.

To obtain a loan it will be necessary that the daily production be a minimum of 20 tons. The petitioners must agree to permit Government agents to visit the establishments, furnishing them with such information as may be required, and concerning any new process employed and to admit in their factories up to 10 apprentices, as well as up to three students, who have completed their course at the School of Mines, to be appointed by the Government for a period of two years. A daily wage of two to five milreis (\$0.50 to \$1.25) is to be paid the apprentices and 10 to 15 milreis (\$2.50 to \$3.75) paid the students.

From the time of the decree, all pig iron and iron and steel which the Government may need will be purchased from the mills to be established under this decree and the values will be regulated by prices paid on imported products, using the c. i. f. price as a basis plus customs duties, dispatch and port charges at Rio de Janeiro. The Government will provide for minimum freight rates on Government railroads and steamship lines for ore, fuel, pig iron, iron and steel, purchased from domestic mills, and on machinery, apparatus and other necessary materials for such mills. The Government may also assist these enterprises by building the necessary railroads to carry ore.

Will Buy Tool Equipment

Arrangements have been completed by the War Department and the Indianapolis Chamber of Commerce by which an addition of 3000 drafted men will be enrolled at the trade schools established in that city. Fifteen hundred men will arrive in the city June 15. The Chamber of Commerce assumed the responsibility of housing, feeding and giving of mechanical training to the men, the Government reimbursing the Chamber of Commerce on the basis of a certain sum for each man. One thousand of the first contingent (the second contingent of 1500 coming later in the summer) will be trained as automobile mechanics and truck drivers. The remainder of this contingent will become gunsmiths and blacksmiths. The Chamber of Commerce is in the market for large purchases of tool equipment for the additional schools. Ernest N. Smith is general secretary of the organization and A. S. Hurrell, assistant superintendent of the city schools is in charge of the vocational work for these Government classes.

Trade Journal's Service to the Steel Industry*

Advantages of the Trade Journal Reading Habit —Influence in Helping to Win the War—Sliding Scale System Testifies to Accuracy of Quotations

BY BERTRAM S. STEPHENSON

Resident Agent, M. A. Hanna & Co., Pittsburgh

Not later than the 6th of June we shall know the tonnage of pig iron produced during the month of May. *THE IRON AGE* and the *Iron Trade Review* will have this information available in their issues of that date. It will have to be compiled rapidly, for the most part by wire, but it will be accurate, as may be demonstrated when the institute publishes its statistics, in elaborate detail, for the six months' period.

This is but one of the many substantial services rendered by the trade papers. One regularly records ore tonnages on lower lake docks. Another, a weekly, reports coke shipments from the region. All through the summer and fall we shall trace through them the progress in the Great Lakes traffic on which this industry so largely depends. Within a few weeks after navigation closes, we shall know the tonnage shipped from every mine on the Superior Ranges.

These services, along with countless others, are accepted as a matter of course, for the trade press is one of the things which American industries commonly take for granted. It has been with us since the days of Bessemer and Kelly, the beginnings of bee-hive coke and the epoch-making shipment of those first few barrels of ore from Marquette. It has developed along with and as a part of the industry, which perhaps explains why we are sometimes prone to overlook its advantages and possibilities.

In describing its province, some one has said that the trade journal bears exactly the same relation to the newspaper or general magazine that the engineer or technically trained man bears to the average citizen. It is a specialized newspaper, fitting naturally into the modern scheme of specialized business. Occasionally this specialization runs to rather curious extremes. There are such publications, for instance, as the *Macaroni and Noodle Makers' Journal*, the clientele of which is obvious; *Brooms, Brushes and Handles*; the *Crow Bar*, which reports 4000 blacksmiths as subscribers; *Sunnyside*, which is a leading publication for undertakers; even the *Angora Journal*, which aims to record everything of interest regarding that particular kind of goat.

A Newark library recently held a trade-journal exhibition and showed 1200 publications without presuming to exhaust the list. "Put several hundred such publications together in a small room," commented the librarian, "and you get an effect wonderfully similar to that produced by several hundred business men in a large room. They are dressed in varying degrees of good taste—some of them a little loud—but all of them, always and everywhere, cheerful and optimistic. This, at least, may be set down as a universal trait of trade papers."

This Newark librarian had original ideas of publicity. By his own admission he did not hope to attract many men of his own city to the exhibit. But he did figure on getting it advertised elsewhere, so that New-

ark men would hear from the outside world that something worth while was happening there. "That is the kind of advertising which reaches the Newark man," he observed, "even though it is a very slow process. What we are trying to do is to impress our manufacturers and business men with the amount of current information on their trades. We want to make it available for them and we want especially to foster the *trade-journal-reading habit*."

Reading and Skimming

The trade-journal-reading habit! Mark Twain once remarked that he had lived in the world a long, long time and he knew one must never judge an editor by what he put in his paper. But even if we were inclined to accept the humorist's suggestion, many of us would not be in position to judge, for we have no idea what the editor does put in his paper. In fact, so far as most of us are concerned, it is hardly accurate to speak of the trade-journal-reading habit, but rather of the trade-journal-skimming habit. And yet our trade and technical papers, to quote Mr. Hurley, are the best in the world. They are tools of the industry and they are made to be used.

Doubtless 95 per cent of the institute members regularly see or have immediate access to the leading publications serving this special field. A goodly portion will say they are "regular readers"—and some of them are. But for far too many of us this reading is of only "a lick and a promise" variety. Probably on an average it amounts to a rather careful survey of a column or two of general market summary, a hurried scanning of certain special market reports in a few important centers and perhaps a casual glance over the personal and obituary items to see whether any business acquaintances are involved in developments of a noteworthy character. Possibly some pictures may catch the eye or some special article hold the attention for a moment before the paper is tossed aside—exhausted.

This estimate is not an exaggeration. The trade papers are read somewhat more carefully in quiet times, more hastily or not at all in busy periods, but this is a fair average and indicates our general neglect of a service of which our foreign competitors show a full appreciation. Their size is awe-inspiring, it is true, some of them approaching the bulk of a mail-order catalog. But, as a matter of fact, the weekly publications will average only about 64 pages of reading matter, because they are edited with the ever-present idea of condensation. Every line of every page is written with a view to reporting accurately some fact, condition, process or accomplishment of interest either to some special field or to the industry as a whole.

We are told that recently some 17,000 homes were visited in the course of an investigation as to the publications read by consumers in a certain district. In one particular home it was found that the publications read were the *Butchers' Review*, the *Police Gazette* and the *Christian Herald*; furthermore, the *Christian Herald* in this case was read by the cook. Now the point is that these papers were read in the home, and it is perhaps pertinent to suggest here that an occasional evening spent quietly at home with your favorite trade paper, whatever it may be, will show results both surprising and profitable.

Browning Gun Description

Besides the strictly technical articles, one will find there much general material of timely interest. For instance, I believe the first satisfactory description of the Browning gun appeared in *THE IRON AGE*. Likewise the *Foundry* explained the manufacture of the



B. S. STEPHENSON

after navigation closes, we shall know the tonnage shipped from every mine on the Superior Ranges.

These services, along with countless others, are accepted as a matter of course, for the trade press is one of the things which American industries commonly take for granted. It has been with us since the days of Bessemer and Kelly, the beginnings of bee-hive coke and the epoch-making shipment of those first few barrels of ore from Marquette. It has developed along with and as a part of the industry, which perhaps explains why we are sometimes prone to overlook its advantages and possibilities.

In describing its province, some one has said that the trade journal bears exactly the same relation to the newspaper or general magazine that the engineer or technically trained man bears to the average citizen. It is a specialized newspaper, fitting naturally into the modern scheme of specialized business. Occasionally this specialization runs to rather curious extremes. There are such publications, for instance, as the *Macaroni and Noodle Makers' Journal*, the clientele of which is obvious; *Brooms, Brushes and Handles*; the *Crow Bar*, which reports 4000 blacksmiths as subscribers; *Sunnyside*, which is a leading publication for undertakers; even the *Angora Journal*, which aims to record everything of interest regarding that particular kind of goat.

A Newark library recently held a trade-journal exhibition and showed 1200 publications without presuming to exhaust the list. "Put several hundred such publications together in a small room," commented the librarian, "and you get an effect wonderfully similar to that produced by several hundred business men in a large room. They are dressed in varying degrees of good taste—some of them a little loud—but all of them, always and everywhere, cheerful and optimistic. This, at least, may be set down as a universal trait of trade papers."

This Newark librarian had original ideas of publicity. By his own admission he did not hope to attract many men of his own city to the exhibit. But he did figure on getting it advertised elsewhere, so that New-

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improved rifle grenade which our malleable shops are now turning out by the millions. Recently a column of facts and figures in another publication, detailing the iron ore reserves of Alsace-Lorraine, Luxemburg and the Brie Basin made clear the motive governing the direction of the first German drive in this war of steel. And these examples might be multiplied indefinitely, but the intention is merely to emphasize the appeal which the average trade paper can make even to the non-technical reader.

A year of war has recast business methods; it has also shifted our centers of news. During that time, as our industries have admitted Uncle Sam—first as a by-no-means silent partner and later in the capacity of managing director—Washington's position as a business news center has become supreme. The trade papers were quick to appreciate this new condition and one can now look to them for industrial-war news which is at once dependable, technically accurate and free from political flavoring. In particular, their reports of the many investigations which have stirred Washington and the country these last few months, carefully written from the business man's viewpoint, have been refreshing in contrast with the reports in the daily press. And in certain directions it is not too much to say that a careful reading of these business papers during the winter might have saved many of us from the hazards of crowded sleepers and Washington hotels.

I hold no brief for the trade journals and the idea here is not to catalog their offerings, but rather to suggest that they merit our better acquaintance. I recall that, a dozen years ago, the owner of a small, isolated blast furnace remarked that he regularly read the several important publications touching his special field. His theory was that, if in the course of a year he could glean from them one good idea applicable to his plant, he would be well repaid. To-day his furnace is the last word in equipment and efficiency and his business is highly successful. This plan of closely watching the technical press for practical, working ideas is now followed by many progressive concerns. Ordinarily it consists of a regular, systematic reading by the various executives and heads of departments. Suggestions are noted on a convenient cover slip and these are later discussed at regular conferences, frequently with the result of important improvements and economies. The plan deserves general adoption.

Buying by Trade Journal Quotations

For many years the industry has found it convenient to use trade journal quotations as a basis for sliding-scale contracts. Pig iron and coke, ingots, billets, sheet-bars and other forms of semi-finished steel, copper and other non-ferrous metals, ingot molds, even gray iron castings, are among the products commonly distributed on such an arrangement. There is no means of estimating the volume of business now handled in this way, even in any one line of production, but it is always substantial and at times surprisingly large. During the chaotic price conditions of the early war period, when precedents were being swept away and new levels reached week by week, there was a very extensive recourse to this basis of dealing, as offering the only plan sufficiently flexible to conform to the feverish gymnastics of war-time markets. It fitted in with Horace Greeley's sage observation of us, the American people, that "our foresight is not so good as our hindsight by a darn sight."

Just now, because of Government price control, the sliding-scale is less extensively employed; yet it is interesting to note that, even during the last calendar year, a single producer in western Pennsylvania supplied a neighboring melter with \$12,000,000 or \$13,000,000 worth of pig iron invoiced on this flexible basis. When the Government schedule was announced in September, the price on this sizable tonnage immediately dropped from around \$55 to \$36.30. The furnace interest, of course, had realized high prices much earlier than its competitors, which were selling on a flat-price contract basis, hence its acceptance of the Washington scale occasioned no great hardship. The fact that the agreed prices automatically became operative on the heavy volume of products moving on sliding-scale con-

tracts was an important factor in their prompt acceptance and scrupulous observance by the entire industry.

The sliding-scale system testifies to the accuracy of trade paper quotations. Incidentally, as well, it increases enormously the responsibility of the editor. In every issue he must tabulate his ideas of current prices, whether or not they happen to be sharply defined. He knows that every variation of 25 or 50 cents immediately multiplies itself by tens of thousands of tons, to the unfair advantage or disadvantage of some one. Actually he serves in the capacity of referee or arbitrator and, in the interests of justice, should have all available information at his command. Yet too often the trade journal men find themselves compelled to pry out the facts from grudging witnesses, to content themselves with half-facts and to piece together scattered bits of obscure information in an effort to arrive at exact market conditions.

To my way of thinking, the point of view which necessitates such methods of news-gathering is radically wrong. It is an inheritance from the dark ages when, in the nature of things, every competitor was an object of suspicion and distrust. Now it is only a fair proposition that, if your business or your industry uses the trade paper quotations in this intimate way, their representatives are clearly entitled to enough of your time and confidence to put them in possession of such facts as have a direct bearing on the current market. For obvious reasons there are always certain developments on which publicity is out of the question. But the biggest men in the industry came to realize, a long while ago, that the trade press would respect their confidence absolutely. And they learned, as well, that the representatives of these papers would welcome a knowledge of facts which, while they could not be printed, still could be kept in mind in shaping quotations on which they had a bearing. In these latter days the industry has come to regard the trade paper man as one gifted, not with a fine sense of rumor but with a finely developed sense of honor and discretion.

It naturally follows, though indirectly, that the buyer or seller who imparts either information which is untrue or half-facts which mislead by reason of what they do not tell—this with the idea of manipulating quotations—should be set down as one whose methods of trading should very properly be watched.

Service in Time of War

Our entrance into the war opened up to the business papers of the country a new field for substantial service. On the first two Liberty loans they contributed more than 7000 pages of advertising and editorial matter. Late in November the Secretary of War sought their assistance in recruiting mechanics and skilled workmen for the Aviation Section of the Signal Corps. Only a few weeks then remained until the draft became effective, and the War Department intimated it would be well satisfied with 12,000 men before that time. The number actually secured was around 43,000.

Early last summer the War and Navy Departments were in urgent need of machine designers. A four months' search had produced 40 and the task was then delegated to the editor of the *American Machinist*. Visiting some 17 machinery manufacturing centers, in 12 days, he rounded up over a hundred designers and persuaded their employers not only to loan them to the nation, but also to pay the difference between their former salaries and the Government limit of \$1,800 per year.

It is also worthy of note that the farfamed Liberty Motor had its origin in a trade paper idea. An automobile journal sent a representative to France and England to study aeroplane motors. He found some 30 types in use. Parts were not interchangeable and men familiar with one type could not operate the others. Astounded at the confusion and loss of efficiency, the editor laid these facts before the proper authorities at Washington, suggesting that America should concentrate on one standardized type. The Liberty Motor was the result.

Regiments of road-builders, miners, railway operatives, quarry-men and lumbermen—to mention only a few—have been recruited largely through the efforts

of the trade papers in their appropriate fields. These journals have been a vitalizing force in the several national campaigns for Red Cross and other relief funds. They have helped to mobilize, to readjust, to energize. And particularly during these last 12 or 14 months the work of the iron and steel publications has been such as to assist and to inspire. They have caught and reflected the spirit of that industry which, we are proud to believe, has led in its whole-hearted, enthusiastic response to the war needs of this nation and its allies.

A year of war has nationalized American business. It has brought a new ideal to dominate our industrial life. It has discarded the old-time considerations of profit and competition and has substituted a new-found incentive which is infinitely bigger. Its demands have speeded up the development of manufacture and trade, so that revolutionizing changes are now made, not in decades, but almost in days.

The War After the War

Along with these new conditions the war has created a difficult situation in which a diminishing labor supply faces an imperative need for increased production sufficient to offset the things consumed and destroyed in carrying on the conflict. While it is on, and when it is over—when we enter that coming commercial struggle which some one calls “the war after the war”—the measure of efficiency will determine the success of any business or any industry. And greater efficiency, as a well-known editor has suggested, “necessarily means closer as well as keener interest in the experiences of others, livelier appreciation of new ideas,

inventions and readjustments of methods. These constitute the very merchandise traded in by the business papers.”

Already they are pointing the way in many problems dealing with the labor situation. We need go no further than the *Bulletin* of the American Iron and Steel Institute to find whole issues devoted to some phase of the question—safety appliances, model gardens, workman-owned homes and other matters of working and living conditions which go to make the laboring man interested, contented and self-respecting. It is a hopeful sign that scores and hundreds of American business papers have taken up this important work. There is no denying the force of persistent publicity and, when it is coupled with the directional force which comes from a constant interchange of practical ideas, sure and steady progress is certain.

A few months ago a convention of trade journal publishers was held in Chicago. It was featured by an exhaustive discussion of the editorial side of their business, and running all through it we find special emphasis laid on what is termed “the creative idea in editing.” “Sitting in an editorial sanctum is a worn-out method,” said one of the speakers. “Business papers are now best edited from the field, and preferably in the shirt sleeves.”

The old theory was to print the news, just the news and nothing more. Then the trade paper lived on its industry. The newer vision is that the trade paper has a far broader service to perform, a mission of leadership in helping the industry to shape its course. When it accomplishes this, the trade paper truly lives for its industry.

Discussion by A. O. Backert

A. O. Backert, vice-president Penton Publishing Co., Cleveland, in discussing Mr. Stephenson's paper, said, in part:

“If you can imagine the existence of the iron and steel business without its trade papers, or the publication of the iron and steel trade papers without the great business of which you are a part, you will establish the relation that the one bears to the other. Let us first consider your industry without its trade papers. A condition of chaos would reign. You would grope in the darkness of misinformation or no information. You would be isolated almost as completely as the far-famed inhabitants of the South Sea Islands. And without the trade papers you would be the target for the insidious, yellow-dog enemy propaganda that blazes up in the byways while the spotlight is turned only on the highways. Progress in manufacturing methods would be halted and industry again would return to the era when the secrets of the arts were handed down from father to son. This is assuming much for the province of the trade papers, yet it might be said, with becoming modesty, that there is much to assume. And as for the iron and steel trade papers without the iron and steel business there simply would be none.

“But the term ‘trade,’ in its reference to these publications long since has been consigned to the discard. It smacked too much of barter and exchange. It recalled too vividly to the publishers the day when the paste pot and the shears were the editor's principal weapons of offense and defense. It reminded them also of that oleaginous, silk-hatted, frock-coated individual whom they employed in the guise of an advertising solicitor, but who instead accepted alms from the manufacturers, which were bestowed with grudging charity. But the paste pot and shears long since have yielded to the editorial staff of highly trained, energetic, up-to-the-minute news gatherers. The editor has discontinued the sport of entering the seat of his trousers in a friction contest with the seat of his chair, while silk hat Harry has been replaced by the advertising specialist who is versed in business building by properly directed publicity aimed only at the man who is interested. This has been the evolution of the trade paper to the business paper and the business

papers of the iron and steel manufacturers, in influence, scope and importance have paralleled the progress of and measure up to the great metal-working industry of which they are a component part.

Province of the Trade Paper

“What is the province of these publications? To disseminate news and information in a specialized field. To record the improvements in processes of to-day that will be the standard textbook practices of to-morrow. To present the experiences of one manufacturer so that the other may profit thereby. To point out to the industry loftier ideals to be striven for, but never attained. And as so aptly stated in a quotation in Mr. Stephenson's able paper, ‘these constitute the very merchandise traded in by the business paper.’ As merchandise it must conform to the latest and most modern styles, and these change every day, every week or every month, depending upon the frequency of publication.

“When you build a blast furnace you expect to operate it day in and day out, year in and year out, along definite, standardized lines. You occasionally make a cast of off iron or blow off the top of the stack, yet your practice remains the same—it is standardized. The same is true of your mills, your steel furnaces and your converters. Now contrast your methods with those of the publisher. He cannot shut down for relining or because of a breakdown. His paper must be issued at the specified time, regardless of contingencies. His publication cannot have an offcast, since every inaccuracy will be caught by thousands of eyes. When one issue is off the press another must be constructed immediately. It must be fashioned to a different pattern than the previous number. It must have a new style, different make-up, and if possible, a greater appeal than the previous issue. The publisher's practice is just the reverse of standard.

“The successful editor of a business paper must be a human paradox. He must have no friends. He must have many friends. He must have no friends in the sense that his loyalty to them would warp his better judgment. He must have many friends upon whom he can depend as reliable sources of news and information. At one glance his vision must take in

every point of the compass, for he has a solemn duty to perform alike for the backwoods foundryman and the producer of millions of tons of steel. Both are purchasers of the only merchandise at the disposal of the editor and the interests of both must be conserved.

Not Now in No Man's Land

"Before Uncle Sam wiped out the law of supply and demand as affecting iron and steel prices, the editor of the iron and steel paper held a position in no man's land, a target for sniping buyers and sellers. In a declining market he was assailed by the producers. In an advancing market, by the consumers. He was damned if he did and damned if he didn't. But Government control has brought him relief and, temporarily at least, he is enjoying a much-needed rest from the barrage that both sides formerly directed toward him.

"Recently much ado has been raised over the paucity of text matter in our business papers as compared with the bulk of advertising. The business paper only performs its function when it builds for the busy business man. Reams and reams of manuscript are condensed to meet the needs of the reader whose time is drawn upon more heavily to-day than ever before. Twice the number of editorial pages could be printed, but with no obvious advantage, when the information can be presented more effectively in one-half the space. The iron and steel business paper is the fine-meshed screen through which news and information of value to the trade is sifted.

"Long before the business papers of your industry attained their present place of importance and value that great iron master, whom we all love and esteem—Andrew Carnegie—was outspoken in his warm and

whole-hearted appreciation of the function performed by them. You, too, have come to a like conviction as evidenced by the kindly receptions you accord both their editorial and advertising representatives.

The Greatest Function

"To serve at all times the interests of producer and consumer, large or small, is the greatest function of the iron and steel business paper. . . . Within a year the entire phase of the iron and steel industry has been changed and with it every phase of the publication of its business papers. The bulwark of their market quotations has been uprooted and replaced by prices fixed by the Government. The center of activity has been transplanted from Pittsburgh, New York, Chicago and Cleveland to Washington. Not content to follow, the business papers lead in this great transition. Editorial offices already established at Washington were enlarged to cope with the ever-growing importance of this center. With the rapid-fire changes that affect every previous method of business conduct the iron and steel papers are serving a greater function to-day than ever before in their history. It is to them that the manufacturer turns for information concerning almost over-night developments, and it is in them that he places his trust because of their established reputation for accuracy.

"In this and other ways the iron and steel papers are serving their country. Wherever the fortunes of this great conflict lead the business papers will follow. They know their duty and may be depended upon to perform it, whatever contingencies may arise. And the business papers of your industry join you in pledging to the Government their supreme efforts and their every resource to win this war."

Discussion by James R. Mills

Mr. Stephenson's paper was to have been discussed also by James R. Mills, manager of sales, Cleveland district, Carnegie Steel Co. Mr. Mills was unable to be present, but sent his paper, which was as follows:

"A college publication of the Middle West had in recent years for its motto this: 'We aim not to mold public opinion, but to scrape the mold off of it.' It can hardly be questioned that the iron and steel industry in times past has not given the heed that it should to uninformed and incorrect public opinion. Much of the time it has seemed that the industry was not sufficiently concerned to even attempt to keep off the mold. Yet, in its relations to the trade paper there has happily come a radical change for the better in recent years. In former days the trade paper in its efforts to get facts was kept at arm's length, except by a few unscrupulous traders whose effort was to constantly play upon the credulity of the trade journals by reporting purely imaginary transactions for the purpose either of mystifying competitors or indirectly influencing market conditions. Some manufacturers did employ press agents, but these for the most part were so restricted in what they were allowed to tell that they pretty well fitted the nickname given them by newspapermen of 'suppress agents.' This attitude did not indicate any particular unfriendliness to the trade journals; it was the period when secrecy was regarded as an absolute essential, both as to operations and commercial transactions.

"The era of candor and co-operation which has followed, and in which this institute has played such an important part, has greatly changed the status of the trade journal. Suspicion of the trade journal has largely gone, along with suspicion of a competitor. With secrecy no longer considered a necessity, the task of a trade journal is greatly simplified. For the trade papers themselves it must be said that in the changing conditions of the last 20 years they have fought as privates in the ranks, making common cause of all that is vital to the industry.

"Mr. Stephenson has shown how much of a necessity the trade journal has become, and how important is the information it gives us from week to week. In the broader field of informing public opinion the present times are giving new importance to the trade journal. In the notable work of Ivy L. Lee in develop-

ing the public relations of the Pennsylvania Railroad his aim was twofold: first, to interpret to the directors and officials of the railroad the opinions and feelings of their employees and of the public, their patrons; second, to interpret to the public the aims and purposes of the Pennsylvania Railroad. To-day there is scarcely an industry that is not vitally interested in what the steel trade is doing, and to a great many people this industry has become the commercial pathfinder. In interpreting to the public and to employees the aims and purposes of the iron and steel industry, the trade journal fulfills one of its greatest services. It is the spokesman of the industry because no other agency has the background to fully comprehend the significance of what is occurring. The daily press, however willing, cannot do this.

"We heartily second Mr. Stephenson's plea that the trade paper be treated as a full-fledged ally entitled to our complete confidence."

Mr. Penton's Remarks

John A. Penton, president, Penton Publishing Co., Cleveland, spoke briefly, dissenting from some of the views expressed by Messrs. Stephenson and Backert. He expressed the opinion that the trade journal is very carefully read, but said he did not feel that in all cases those who have information give it as freely as they ought to do to the trade papers.

Retained as Consulting Engineers

Freyn & Co., engineers and contractors, Chicago, have been retained as consulting engineers in the design and erection of No. 1 blast furnace, including coke oven plant, of the Phillips Sheet & Tin Plate Co., Weirton, W. Va. The furnace plant will be rated at 600 tons production, and will be of the same type of construction as that of No. 5 Iroquois furnace recently completed by Freyn & Co., and the No. 1 furnace of the Mark Mfg. Co.

Standardized farm wagon dimensions have been adopted by the Farm Wagon Department of the National Implement and Vehicle Association to become effective not later than June 1, 1919. They cover wagon capacities from 1500 lb. to 6000 lb.

Export Movement Shows Improvement

Detailed Figures of Government Shipments Not Available, but Belief Is That April Exceeded All Previous Records—Decline in Imports Continues

WASHINGTON, June 4.—The export movement of iron and steel in April as shown by the figures of the Bureau of Foreign and Domestic Commerce, which do not include shipments of Government material on transports, reflect a substantial recovery from the low levels reached in March, and while detailed figures of Government exports are not available, it is believed that the combined exports for the month broke all previous records. This is especially significant in view of current priority orders diverting material to the shipyards and to manufacturing establishments working almost exclusively on Government contracts.

The total exports of iron and steel by values in April gained a small fraction of 1 per cent over the corresponding month of 1917, but rose 30 per cent above the total of March of this year. As compared with the high record scored in December, 1917, April exports by values declined 14 per cent. Tonnage commodities fell 10 per cent below the exports of April, 1917, and declined 29 per cent from the record figures of 1917, but gained 22 per cent as compared with March of this year. Machinery, the shipments of which have recently shown important gains, rose 13 per cent over April, 1917, and 10 per cent over March of this year, but fell 17 per cent below the maximum figures of last December. Exports of metal-working machinery are still on the down grade, the total for April showing a decrease of 43 per cent from the level of April, 1916, and no less than 63 per cent from the high-water mark of May, 1916. For the ten months ended April, 1918, exports of iron and steel by values increased 4.3 per cent over the total for 1917, which was nearly 100 per cent in excess of that of the corresponding period

Exports of Iron and Steel

	April		Ten Months	
	1917	1918	1917	1918
	Gross Tons	Gross Tons	Gross Tons	Gross Tons
Pig iron.....	44,783	.....	620,412	.....
Ferromanganese.....	.....	5,504	.....	4,138
Ferrosilicon.....	.....	2,263	.....	8,524
All other pig iron.....	.....	10,515	.....	317,696
Scrap.....	12,966	.....	216,527	21,806
Bar iron.....	3,467	3,272	50,844	41,877
Wire rods.....	11,834	19,845	114,464	169,927
Steel bars.....	73,228	60,478	635,199	530,178
Billets, ingots and blooms, n.e.s.....	162,209	177,128	1,577,205	1,680,090
Bolts and nuts.....	2,119	1,868	24,544	25,617
Hoops and bands.....	3,471	4,499	35,808	51,205
Horseshoes.....	459	252	3,703	8,356
Cut nails.....	328	678	3,883	4,207
Wire nails.....	6,999	6,075	104,724	97,622
All other nails, includ- ing tacks.....	1,804	555	15,216	11,259
Cast-iron pipes and fit- tings.....	2,945	3,698	62,106	65,591
Wrought pipes and fit- tings.....	9,049	5,333	140,837	86,361
Radiators and cast-iron house-heating boilers.....	458	154	3,225	2,493
Railroad spikes.....	809	471	15,496	12,525
Steel rails.....	38,410	39,463	513,224	353,450
Galvanized iron sheets and plates.....	5,724	4,632	74,155	64,779
All other iron sheets and plates.....	6,167	4,104	39,607	47,878
Steel plates.....	47,612	34,413	306,650	379,627
Steel sheets.....	9,757	18,361	91,259	148,141
Ship and tank plates, punched and shaped.....	.....	42,162	.....	426,882
Structural iron and steel.....	26,431	18,169	285,061	209,924
Tin and terne plates.....	19,936	24,235	184,206	183,919
Barb wire.....	13,763	12,509	277,291	142,373
All other wire.....	16,453	12,219	200,577	146,336
Total.....	521,176	465,865	5,665,921	4,842,631

^a Not separately enumerated prior to July 1, 1917.

Exports of Machinery

	April		Ten Months	
	1917	1918	1917	1918
Adding machines.....	\$236,224	\$168,083	\$1,430,553	\$1,709,522
Air-compressing machinery.....	127,124	138,474	945,018	1,163,898
Brewers' machinery.....	39,687	866	53,926	227,132
Cash registers.....	113,386	38,459	1,214,169	424,799
Parts of.....	12,201	1,619	108,377	51,953
Concrete mixers.....	.....	a37,251	.....	a243,948
Cotton gins.....	6,375	6,915	95,911	117,549
Cream separators.....	86,231	75,368	370,348	468,412
Elevators and elevator machinery.....	232,701	61,397	1,770,865	1,589,425
Electric locomotives.....	9,050	14,492	483,052	137,171
Gas engines, stationary.....	104,158	25,945	565,644	485,720
Gasoline engines.....	2,393,950	4,694,359	13,886,415	27,588,182
Kerosene engines.....	.....	718,476	.....	4,416,767
Steam engines.....	2,460,191	3,642,513	15,811,202	34,235,672
All other engines.....	635,379	872,971	4,141,770	3,094,553
Parts of.....	1,402,828	.....	14,164,911	.....
Boilers.....	.....	a158,739	.....	a3,101,963
Boiler tubes.....	.....	a441,305	.....	a5,336,961
All other parts of engines.....	.....	a2,926,889	.....	a15,631,679
Excavating machinery.....	.....	a152,286	.....	a860,776
Milling machinery, flour and grist.....	77,456	38,439	982,490	789,105
Laundry machinery, power.....	46,102	8,721	268,540	307,018
All other.....	19,092	20,126	264,777	235,732
Lawn Mowers.....	25,099	26,473	141,668	202,621
Metal-working machinery (including metal-working tools).....	6,250,728	.....	69,833,155	.....
Lathes.....	.....	a619,523	.....	a13,570,259
Other machine tools.....	.....	a925,644	.....	a9,013,699
Sharpening and grinding machines.....	.....	a465,180	.....	a5,348,246
All other metal-working machinery.....	.....	a1,570,744	.....	a20,313,538
Meters, gas and water.....	56,819	31,945	330,337	403,552
Mining machinery, oil well.....	81,629	123,191	1,552,150	1,658,650
All other.....	865,990	707,414	8,221,153	9,020,989
Paper-mill machinery.....	182,074	200,609	1,524,719	1,556,475
Printing presses.....	139,848	74,393	1,540,799	1,124,537
Pump and pumping machinery.....	467,593	501,731	5,028,068	5,405,598
Refrigerating and ice-making machinery.....	70,696	156,542	718,052	1,257,298
Road-making machinery.....	.....	a36,860	.....	a416,772
Sewing machines.....	589,952	539,397	5,047,353	6,668,501
Shoe machinery.....	116,355	50,477	1,114,731	1,284,015
Sugar-mill machinery.....	627,011	568,272	9,950,165	10,603,058
Textile machinery.....	237,831	504,696	2,904,537	4,202,341
Typesetting machines.....	57,781	31,520	916,935	999,638
Typewriting machines.....	944,931	402,360	9,281,693	6,174,194
Windmills.....	115,516	27,285	712,782	920,155
Woodworking machinery, saw mill.....	35,637	90,762	391,878	790,461
All other.....	63,706	44,691	801,399	819,264
All other machinery and parts of.....	3,008,215	2,836,435	34,873,258	34,005,080
Total.....	\$21,939,582	\$24,869,837	\$211,442,800	\$237,976,872

^a Not separately enumerated prior to July 1, 1917.

Imports of Iron and Steel

	April		Ten Months	
	1917	1918	1917	1918
	Gross Tons	Gross Tons	Gross Tons	Gross Tons
Ferromanganese	6,846	2,575	67,905	23,382
Ferrosilicon	1,108	—	96,321	5,173
All other pig iron	817	550	28,271	16,618
Scrap	34,681	3,499	181,844	59,073
Bar iron	60	22	4,208	2,321
Structural iron and steel	63	157	793	6,879
Steel billets without alloys	3,529	2,183	9,676	32,399
All other steel billets	401	589	9,756	7,335
Steel rails	577	374	11,786	7,985
Sheets and plates	97	44	1,683	1,961
Tin and terne plates	34	—	608	32
Tin scrap	—	792	—	6,888
Wire rods	—	587	2,063	3,464
Total	48,213	11,372	414,914	173,510
Manganese, ore and oxide of	27,023	58,023	512,041	489,754

for any previous year. Tonnage commodities fell off 14 per cent from the record figures of 1917, machinery gained 13 per cent, while machine tools lost 30 per cent.

The value of all exports of iron and steel products in April was \$102,852,915 as compared with \$102,560,345 for the same month of 1917 and \$58,655,447 for April, 1916. For the ten months ended April, 1918, the aggregate was \$941,400,903 as against \$903,106,411 for the same period of 1917 and \$472,032,656 in 1916. Exports of machinery in April were valued at \$24,869,837 as compared with \$21,939,582 for the same month a year ago. The highest total previously recorded was that in December, 1917, when machinery shipments were valued at \$30,051,092. For the ten months ended April, 1918, the exports of machinery were valued at \$237,976,872, as compared with \$211,442,800 for the same period of 1917. Shipments of metal-working machinery in April aggregated \$3,581,091 as compared with \$6,250,728 for the same month of 1917. For the ten months ended April, 1918, machine tool exports totaled \$48,245,736 as compared with \$69,833,155 for the same period of 1917. Details of the exports of machinery in April, 1917 and 1918, and for the two ten months' periods are given in the accompanying table.

Exports for which quantities are given aggregated 465,865 gross tons in April, 1918, as compared with 521,176 tons for the same month of 1917. The high record for this movement was made in December, 1917, when the shipments aggregated 656,044 tons. For the ten months ended April, 1918, these exports totaled 4,842,631 as compared with 5,665,921 for the corresponding period of 1917. The accompanying table shows the exports for April and for the ten months ended April, 1918, as compared with 1917.

Imports of iron and steel in April, 1918, amounted to less than 25 per cent of those for the same month of 1917, the total being 11,372 gross tons as compared with 48,213 gross tons in April, 1917. Imports have been steadily declining throughout the past fiscal year and the figures for the 10 months ended April, 1918, show a total of but 173,510 gross tons as compared with 414,914 for the corresponding period of 1917. Imports of iron and steel and of manganese for April and for the 10 months of 1917 and 1918 are shown in the accompanying table.

W. L. C.

Picric Acid Plants

A new picric acid works to be used in connection with the manufacture of high explosives will be erected by the Butterworth-Judson Corporation, Newark, N. J., at Brunswick, Ga., for the Government. A site of about 1600 acres has been acquired for the proposed works, which will have a capacity of over 50,000,000 lb. of explosives per year. It is said that the plant will cost over \$8,000,000 and will give employment to 4000 persons for initial operations and will be ready for production by Nov. 1. George A. MacIntosh is first vice-president.

The Bureau of Ordnance, War Department, will equip at Little Rock, Ark., a picric acid plant to cost about \$4,000,000 complete. The Pratt Engineering & Machinery Co., 25 West Forty-fourth Street, New York, is in charge of the work, holding a sub-contract from the Everly & Davis Chemical Co., 25 West Forty-fourth Street, New York.

ELECTRIC FURNACE FOR BRASS

Patents Controlled by Bureau of Mines and Licenses Free

WASHINGTON, June 4.—The perfecting of a new type of electric furnace for melting brass, and that may perhaps be employed for other purposes, is announced by the Bureau of Mines. It is known as the Rocking electric furnace and patents taken out by the bureau have been assigned to Secretary of the Interior Lane as trustee. Free licenses to operate under the patents can be obtained by making application through Van H. Manning, director of the Bureau of Mines. The new furnace, which it is claimed will reduce the important losses in brass melting, is the result of 5 years' experimentation by H. W. Gillett, chemist of the Bureau of Mines, in co-operation with the laboratory of Cornell University, the American Institute of Metals and a number of manufacturers of brass.

Since the war it has been impossible to obtain the imported materials for brass melting crucibles, and manufacturers have had to put up with crucibles of much poorer quality and at a cost many times that of pre-war prices. With the huge tonnage of brass needed for war purposes, such as shells for cartridges, manufacturers have been anxious for a solution of the crucible problem. The bureau states it is inevitable that the next few years will see electric furnaces largely replacing crucible furnaces and that there will be a development comparable to that seen in the steel industry in the last few years. The electric furnace, it is also declared, will greatly decrease the loss of zinc which, together with copper, makes brass. Zinc boils at a much lower temperature than copper, and thus there have been large losses in the open crucible furnace through volatilization of the zinc. The electric furnace is closed and these losses are avoided. It is estimated that the unnecessary losses in brass making are more than \$3,000,000 a year in normal times and perhaps \$10,000,000 a year in war times. Another claim for the electric furnace is that it gives more healthful working conditions for the men.

The Michigan Smelting & Refining Co., Detroit, Mich., already has one of these furnaces in operation and has four more under construction. The C. B. Bohn Foundry Co., Detroit, is building two.

Large Expenditures Planned

SEATTLE, WASH., June 3.—It is estimated that more than \$150,000,000 will be disbursed in Seattle during the coming 12 months for cargo ships, as compared with about \$75,000,000 in the last 12 months. In the entire Washington district, approximately \$185,000,000 will be disbursed during the same period. These figures relate only to Government shipbuilding expenditures and take no account of naval construction for foreign governments, or shipbuilding work for private interests. Taking the latter two into consideration, it is estimated the Seattle district will receive more than \$165,000,000 for the next 12 months.

Canvass of the leading factories in Seattle employing 50 or more persons, by the Industrial Bureau of the Chamber of Commerce, shows that 35,112 persons are employed in manufacturing industries, and that at least 10,000 persons will be added by Jan. 1, 1919. The majority of these industries are engaged in war work, either directly or indirectly, and in many cases are working two and three shifts daily. With the merger of the Seattle Construction & Dry Dock Co. with the Skinner & Eddy Corporation, and the awarding of heavy Government contracts, the number of shipyard employees will be greatly augmented.

In the Mahoning Valley, Ohio, there is a total of 26 blast furnaces, and in the Shenango Valley, Pa., 19 blast furnaces, and of these only three are now idle. One is Stewart Iron Co. stack at Sharon, Pa., blown out last week for re-lining and repairs, Mattie furnace of A. M. Byers & Co., Girard, Ohio, and No. 3 blast furnace of the Carnegie Steel Co. at Farrell, Pa., also out of blast for re-lining and repairs.

Manganese Conservation in Steel Making*

Our National Requirements and Supply— Lower Manganese in Steel Specifications —Changes in Recarburizing Methods

BY C. R. ELLICOTT

THE object of this paper is to show, first, the true manganese situation; second, to suggest from a manufacturer's point of view, possibilities of conservation and to request suggestions and criticisms which will produce a national saving of this important metal. A general modification of standard practice and intelligent revision of specifications, both as to raw materials and finished products, will effect a considerable saving of manganese.

The Effect of Manganese

Manganese is used in steel making for three distinct purposes:

In the melting operation it is of great advantage up to a certain percentage of the charge, as a deoxidizing agent for making ingots which can readily be rolled or forged with the minimum amount of scrap and defective material.

It is used in specified percentages to give desired physical results in the finished product, acting as an alloy.

It is added to obtain a specified percentage in the finished material, but not for the hot working qualities of the steel nor for desired physical properties which would necessarily be a function of manganese. It is added as a matter of accepted practice subscribed to by both producer and consumer without considering manganese conservation.

As a deoxidizing agent, if an appreciable percentage of residual manganese can be maintained in the open-hearth furnace from the time the charge is melted, until it is tapped, further additions of manganese can be eliminated in high carbon steels, and greatly reduced in lower carbon steels to produce the same ductility in rolling which would be expected from heats which were low in residual manganese and finished with high manganese recarburizing additions. This practice will not reduce the total pounds of manganese added to a ton of steel, but it will permit the use of a lower grade of manganeseiferous material available in this country to replace the higher grade material which in normal times has been imported.

As to physical properties, steels used in the rolled, forged, cast or annealed condition embrace by far the greatest tonnage of steel produced. The effect of manganese on the physical properties of these steels is to increase the elastic limit and tensile strength. In cases where this is the sole purpose of manganese additions we suggest the use of other strengthening elements, preferably carbon.

In heat-treated steels of normal manganese content the effect of manganese is similar to nickel, except that its influence is not so marked. Its effect is to retard the transformation of austenite in cooling. The use of manganese for improving the physical properties of heat-treated steels is not essential, as this improvement can be obtained by other available elements. We suggest that where nickel can be substituted the use of manganese be restricted, and in other cases, where it plays no part in heat-treated results, it be reduced to a point where its function is of forging or rolling importance alone.

There is no question but that many consumers specify a manganese content for no reason within their knowledge and for no special purpose. If only the physical qualities in forged, rolled, cast or heat-treated products were specified the manufacturer would be free to economize in manganese.

Manganese Requirements for Steel Manufacture

Classing the various grades of steel roughly according to the manganese content usually specified we have:

*Abstract of a paper presented at the fourteenth general meeting of the American Iron and Steel Institute at New York, May 31, 1918. The author is superintendent of furnaces and mills, Lehigh plant, Bethlehem Steel Co.

Class 1. Low carbon steels below 0.25 per cent carbon, such as structural steel shapes, plates, etc.

Class 2. Medium carbon steels 0.25 to 0.80 per cent and high manganese steels, including Bessemer and open-hearth carbon steel rails, and many other products.

Class 3. High tensile carbon and alloy steels containing 0.60 to 0.70 per cent manganese, such as gun forgings and castings, marine and heavy machinery forgings and castings, etc.

Class 4. High carbon low manganese steels, high carbon and other steels involving comparatively small tonnage.

The tonnage of ingots of these classes was approximately as follows, for the year 1916:

Class	Tons	Per Cent of Production
1.....	21,350,000	49.89
2.....	11,999,187	28.06
3.....	9,008,186	21.07
4.....	417,307	0.98

The steels of Class 1 are considered as low tensile, or soft steel, having usually an ultimate strength below 70,000 lb. per sq. in. The method of manufacture for the same grades varies between manufacturers. Some prefer to make what is known as "dead" steel, which contains on an average 0.60 per cent manganese; others "churned" or "rimmed" steel, analyzing on an average 0.35 per cent manganese. Assuming that the average of all steels in this class is 0.50 per cent manganese, and that the residual manganese in the steel bath in the furnace would be less than 0.10 per cent, with 30 per cent less of manganese added, this steel would require an addition of 0.60 per cent of metallic manganese or a total of 128,100 tons.

In Class 2 the manganese varies from 0.40 per cent to 1.40 manganese, the average being about 0.70 per cent. In this class probably the greatest proportional conservation of manganese could be accomplished. Assuming a residual manganese of 0.10 per cent before tapping and a normal manganese loss of 20 per cent this class would require an addition of 0.75 per cent manganese, or a total of 89,986 tons of manganese.

In Class 3 a considerable percentage of the product to-day is forgings for guns and ships and castings made from both acid and basic steels. These steels will average 0.65 per cent manganese in the finished product, and will have a normal manganese loss of 20 per cent. With a residual manganese of 0.15 per cent before tapping the final additions would be 0.63 per cent. With 0.20 manganese charged, the total requirements would be 74,767 tons of manganese.

In Class 4 the manganese additions are small, for to use a mill term the heats are "caught coming down."

The total manganese requirements from 1916 figures are therefore:

Class 1.....	128,100 tons manganese
Class 2.....	89,986 tons manganese
Class 3.....	74,767 tons manganese
Class 4.....	417 tons manganese
	293,270 tons manganese

This is equivalent of 366,600 tons of 80 per cent ferromanganese.

Manganese Supply for Steel Manufacture

The manganese alloy production and imports of the United States for 1917 was:

	Gross Tons
Ferromanganese produced	286,000
Ferromanganese imported	45,381
Spiegel produced	193,291
Total contained manganese produced and imported ..	304,000
Manganese ore imported	629,971
Ferromanganese from imported ores	300,000
Contained manganese in alloy produced from imported ores	240,000

The domestic production of high-grade manganese ore for 1917 is estimated by the U. S. Geological Survey at 122,275 gross tons, and this is expected to reach 172,900 tons in 1918. Using the 1918 figure, this will net only 70,000 tons of 80 per cent ferromanganese or 56,000 tons of contained manganese. The low grade ores are being produced at an estimated rate of 800,000 tons for 1918. This will yield about 340,000 tons of an alloy containing an average of 35 per cent manganese, or 119,000 tons of contained manganese.

The situation is, therefore, briefly this: We require, at our present rate of steel production, present specifications and methods, 293,270 tons of contained manganese per year, and we are producing in 1918 at the rate of 175,000 tons from our own raw materials.

The majority of the steels in Class 1 could be "churned" or "rimmed" steel with 0.20 to 0.40 per cent manganese, and of as good quality and, at the same time, eliminate the use of high-grade ferromanganese.

In Class 2 recarburizing could be done with 5 to 6 per cent manganiferous iron, or spiegel and iron below 0.15 phosphorus mixed in the proper proportions and added molten.

In Class 3 the highest grade ferromanganese could be used for probably half of the product. With comparatively low carbon and high manganese the low-grade manganese alloys would not be suitable because of the proportion of manganese to carbon. In acid steels of low phosphorus the use of the lower grade alloys would be prohibitive, due to the impossibility of producing a low phosphorus low manganese alloy.

In Class 4 spiegel or alloys containing less than 20 per cent manganese could be used entirely.

By using pig iron containing 2 to 2.50 per cent manganese in open-hearth charges the residual manganese in the steel before tapping will vary between 0.20 to 0.40 per cent, so that in many cases further additions of manganese for deoxidizing purposes are not required, and the final manganese additions are for physical properties only. With basic steel at 0.40 per cent carbon, 10 points of manganese would add 2500 lb. per sq. in. to the tensile strength. The same effect could be accomplished with three to four points of carbon.

By changing or standardizing our method of recarburizing, adopting a standard process for the manufacture of soft steels and lowering our specified manganese requirements where possible, we can reduce the total tonnage of manganese from 293,270 tons to 247,519 tons, or 15.6 per cent. Further, the requirements of 80 per cent low phosphorus ferromanganese is reduced to 35,470 tons.

The estimated production of 80 per cent ferromanganese from domestic ores will net 70,000 tons for 1918. The manufacture of 60 per cent ferromanganese will require high-grade ores so that 25,085 tons of 60 per cent ferromanganese will lower the possible production of 80 per cent from 70,000 tons to about 51,200 tons. Of 40 per cent ferromanganese 40,135 tons should be made from the lower grade ores. This will require approximately 100,000 tons of ore. This leaves about 700,000 tons which will produce 520,000 tons of alloy averaging 20 per cent manganese. This would leave a shortage of 150,140 tons of spiegel.

In the last 12 years the spiegel production has varied from 83,000 to 348,000 tons per year. What proportion of the ore available for the manufacture of 35 per cent manganese has heretofore been used for spiegel manufacture is impossible to estimate without a detailed canvass. The fact is that there are great quantities of low-grade manganiferous iron ores in this country. The use of 1.50 to 2.50 per cent manganese pig iron in the open-hearth charge would reduce the quantity of manganese required for additions, approximately 15 per cent for basic open-hearth steels, or a further reduction of 10.6 per cent manganese in the total steel produced.

There is ample reserve of ores to produce sufficient 5 to 6 per cent manganese recarburizing iron for a considerable period. The annual requirements of this grade would be approximately 900,000 tons, which could

probably be increased to produce a further saving of 10 per cent spiegel.

Phosphorus Content of Manganese Alloys

It has been customary for us to specify a phosphorus content in ferromanganese of not over 0.25 per cent. This is probably not so vital as we have always considered it. For example, an addition of 0.60 per cent manganese using 80 per cent ferromanganese of 0.25 per cent phosphorus, would cause a phosphorus addition to the steel of less than 0.002 per cent. In most cases this limit of 0.25 per cent could be appreciably increased without affecting the quality of the product. The addition of 0.50 per cent manganese through the

use of spiegel would add to the steel 12 points of carbon, and assuming we could afford 0.015 points of phosphorus, the spiegel could contain 0.600 per cent phosphorus (which is well above the content which spiegel produced from our own ores would contain). For basic steels this would be no hardship; for sheets and tin plate it would be an advantage, but for high-grade acid steel the 80 per cent ferromanganese would necessarily be used on account of the phosphorus.

A serious difficulty (deduced from an analysis of the phosphorus content of the ores of the country) is the selection of furnaces for the manufacture of the various alloys, the economic transportation of raw materials and the distribution of the product to the best advantage. How this can be done will require thought and cooperation on the part of all consumers of manganese.

Conclusion

As a metallurgical proposition we have tried to show how the manganese situation of to-day can be met in the various steel making departments in our own plants. The steps as outlined are briefly:

United effort and co-operation of all steel producers on a pre-determined set of plans. Co-operation of the steel consumer in revising downward the specified percentage of manganese in finished steel and upward allowable limits of phosphorus. The use of manganiferous iron in open-hearth charges to increase the residual manganese in the open hearth process. The production of a majority of soft steels by the "churning" or "rimming" method. The use of approximately 6 per cent manganese iron with phosphorus below 0.150 per cent for recarburizing. The use of 20 per cent spiegel, 60 and 40 per cent ferromanganese for recarburizing. The use of 80 per cent ferromanganese only in high grade low phosphorus acid steels, high speed and carbon tool steels made by the crucible process and manganese steel of 11 to 14 per cent.

With our present methods of recarburizing, if imports were suddenly cut off, we would find our production of steel greatly impaired. Our country is actually short less than 160,000 tons of 20 per cent spiegel or 11 per cent of our manganese requirements, if we will use to best advantage the ores that we are producing at our present rate. But with our present methods we are short approximately 40 per cent. The ores are available for spiegel production, but they must be mined and converted.

It cannot continue to be a question of costs, nor can the usual routine of specifying and buying ferromanganese remain. This situation demands the guidance of a strong, able, impartial committee of the Iron and Steel Institute which knows, and can tell or show, how our materials are to be used.

Discussion by A. N. Diehl*

It may be well to draw further attention to the general underlying principles involved, as well as to some salient practice features, which should not be overlooked.

The whole problem of manganese conservation divides itself automatically in two parts:

Prepare the ferroalloys to the best advantage of the available ore supply, and ultimate use of the same alloy.

Consume the alloys to the best economic advantage, with regard to the proportionate supply, and adequate practice supervision.

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Quite a large proportion of our domestic manganese ore is rather high in phosphorus. It may generally be stated that any low phosphorus ore containing over 6 to 1 ratio between iron and manganese with a content of 40 per cent iron or over might be considered as a source of recarburizing manganese. Mixtures of such lower grade ores with higher ones can be varied to produce any predetermined alloy, depending on the metallic ratios. It might be well to study this phase after a canvass of the deposits are available and determine if any grade between the commonly called ferromanganese and spiegel grade would not be desirable.

The production of ferromanganese of the 80 per cent variety requires ore of high metallic content, which is mostly imported. The shipping and embargo conditions make it absolutely necessary, therefore, to use such cargoes to the best advantage, by mixing them with our native production in such manner as to make the greatest quantity of the latter available as an alloy. This will result in the application of lower alloys than we were formerly accustomed to. The application of the spiegel cupola practice, principally for low grade alloys, is extremely flexible, and a manufacturer of high carbon steel, especially in quantity, should consider such installation carefully. In most cupola practice, the alloy is diluted with pig iron to 5 or 6 per cent of manganese, depending on carbon and manganese specifications. A 16 per cent alloy cannot be used in open-hearth practice for carbon below 0.25 to 0.30 per cent and a portion of it will, at least, have to be melted or charged in the furnace.

Methods of Addition

Manganese is introduced in the steel in several different ways:

In the ladle cold or heated, as is generally done in the Bessemer process with a loss of 20 to 25 per cent.

In the open-hearth furnace, where it is melted with the bath and having an accompanying loss of 50 per cent.

As a combination of the two former methods where conditions are heavy with an average loss of approximately 30 per cent.

In the molten condition introduced into the ladle with a loss of 15 to 20 per cent in spiegel and 20 per cent loss in ferromanganese, or as in manganeseous pig iron recarburization where it is poured through the furnace showing a loss of 25 to 30 per cent, but such manganese should be considered as a constituent of the iron rather than in the recarburizer class.

The chemical range of the carbon content in the iron-manganese alloy of 95 to 2 and 12 to 80 proportion is approximately from 3.75 to 6.50, increasing gradually through the different ranges with slight variation, due to the other metalloids. As the carbon range is thus comparatively small, the manganese content is the principal factor determining which should be the proper alloy to use.

As long as 80 per cent ferromanganese was available the cold ladle addition was the most economic course to pursue, and should still be utilized to the fullest extent with the more diluted grades. Cold ladle additions up to 30 lb. per ton should not be excessive. We have used 40 lb. per ton in 60-ton heats at a number of plants. Care in heat manipulation, however, is necessary in such cases. Obviously the carbon requirement will be the determining factor. The Carnegie Steel Co. of the United States Steel Corporation, as well as several other subsidiaries, for a considerable period has been using 60 per cent ferromanganese as a substitute for the 80 per cent grade, and has obtained equally good results. The only change noticed was in raising the carbon limits somewhat. The low practical limit being about 0.12 per cent carbon. With a 50 per cent grade, making 0.50 manganese steel, the carbon limit would be about 0.16 per cent. All higher carbon or manganese specifications can be met without difficulty. The Steel Corporation has changed its spiegel grade to 16 per cent manganese, with a prospect of still further reduction.

The greatest real conservation will, of necessity, be centered in the judgment and activity of the operator, who must appreciate the urgency and expediency of such effort. A few reminders in the form of don'ts

which, although well known, are sometimes overlooked, may serve either to close an avenue of loss, or as an idea tending toward further investigation, are as follows:

DON'T forget that the foreign supply of manganese ore is largely embargoed, and water transportation almost prohibitive, and also that steel, up to the present date, cannot be made without manganese.

DON'T overlook the fact that there are some low manganese deposits in this country which can be worked with some difficulty perhaps, but which *must* be utilized to bring up the available supply necessary to carry on full operations.

DON'T, as a manufacturer of manganese alloy, allow any wastage of metallic content beyond what is absolutely necessary, and keep the percentage of fines to a minimum. Large lumps will sink into the bath while the fines will often be lost in the slag. Keep alloy away from moisture. Be careful to keep grades separated and ores properly analyzed, and mixed for specific grades.

DON'T, as a manganese alloy consumer, allow melters and helpers to cover bad melting practice by large additions of manganese to restore over-oxidized conditions in the furnace. Proper attention to the melting of heats will save both manganese and money.

DON'T use high grade alloy when a lower will suffice, as in our native supply the low grade ore is greatly predominant. Melting the recarburizer and pouring direct into the ladle, thereby being able to use a low alloy, should be done wherever justifiable and practicable. Also do not waste high-manganese scrap or slag having the proper chemical contents for recovery. The scrap can be used in spiegel cupolas.

DON'T put any alloy into the furnace direct, until the maximum of cold ladle additions are made. Pre-heat if deemed advisable. Authorities differ as to this, but we may assist in solving the controversy. Some few specifications will require a washing, and others excessive amounts of manganese, which must be furnace additions, but the most conservative methods should be applied in accomplishing the purpose.

DON'T overlook the manganese in pig iron when it can be used to recarburize, as its manganese can be of great use, especially in high-carbon, low manganese specifications, also high-manganese iron will give 3 to 5 points more residual than a lower one, thus making available a supply otherwise wasted, as this manganese could not be considered under the recarburizer grade.

DON'T forget that high-carbon heats caught "coming down" will retain a high residual manganese if a fifty-fifty iron and scrap charge and no run-off slag is used; 0.20 to 0.25 per cent may be saved in many cases. With a run-off slag, the manganese is mostly lost.

DON'T, as a steel consumer, insist on a maximum manganese specification if one of lesser chemistry is equally applicable, and possible of performing the same duty. The steel manufacturer must still meet the requirements and will not go beyond a point where the product may be affected, also some of the native ores contain considerable phosphorus, and a high limit to 0.06 or 0.07 in open-hearth and a few points in Bessemer steel will not affect a hardship in many cases, especially in material where little risk is encountered.

The above remarks may outline a few of the ways in which saving may be effected and is offered not as a manufacturer's request, but as an urgent call for a general manganese conservation rally. The subject is of sufficient importance to justify every manufacturer or consumer to be equally concerned and aid by every means in his power the conservation of this necessary element, as well as to make available a portion of our native resources, for which we have heretofore been dependent on other nations.

Discussion by Dr. G. B. Waterhouse*

We, as an institute, may take pride in the fact that our sub-committee on ferroalloys has done and is doing some of the most valuable work in the country to-day in this connection. At a recent meeting called by the sub-committee in Pittsburgh, which was well attended, the decision was reached that standard ferromanganese should be lowered from 80 to 70 per cent

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manganese, and standard spiegeleisen from 20 to 16 per cent manganese. This decision makes available very large tonnages of ores in this country. Also our committee is working in close touch with the Shipping Board and the War Industries Board, the present arrangement with the former being that ship tonnage will be provided for the importation from Brazil of 35,000 tons per month of high-grade manganese ore. Also the Bureau of Mines must be mentioned. This quiet but most efficient branch of the Government service has been indefatigable in following up and placing on record all possible sources of supply in this country. It is also working with the steelmakers along the lines of the proper use and conservation of the various grades of manganese alloys when produced.

As Mr. Ellicott points out, the ordinary low carbon steels constitute about 50 per cent of the country's production. For the majority of these steels the low limit of the manganese specification should be removed entirely, which would allow the steelmaker to furnish steel with approximately 10 points less manganese than at present. This in itself would bring about a great saving, and by the use of a 70 per cent or even a 60 per cent ferroalloy the domestic manganese ores could be drawn on to a much larger extent than at present.

Residual Manganese in the Bath

Mr. Ellicott is also perfectly correct in laying stress, as he does, on the importance of the residual manganese in the open-hearth bath. By making special arrangements and paying attention to local conditions the manganese in the basic open-hearth charge can be raised in many cases. This will bring about important results that cannot be gone into now, but among them will be an increase in the residual manganese in the bath, and this in itself will greatly reduce the final additions of manganese alloy necessary.

This is such an important matter, one that can lead to such great savings and one so little understood even by open-hearth men, that a little more may be said on it. In the case of ordinary open-hearth plate let us assume that the specifications are so changed that the steelmaker can safely aim at 0.35 per cent manganese in the finished steel. If the residual manganese in his bath is 0.10 per cent, then enough manganese alloy has to be added to take care of the oxidation loss and introduce 0.25 per cent into the steel. By making suitable arrangements let us assume that the manganese in the original charge is raised so that the residual manganese in the bath is 0.20 per cent. He then has to add enough alloy to his metal to take care of the oxidation loss (which in this case will be less) and to introduce only 0.15 per cent into the steel. This means a direct saving in final ferromanganese additions of 40 to 50 per cent, and nothing has been assumed but what is feasible, workable, and which can be carried out in practice.

Special Practice at Lackawanna

Another very important class of ordinary steels contains 0.35 per cent and upward of carbon, and at the present time constitutes certainly 25 per cent of the country's output. It includes all the rail and shell steel and many forging steels. It would be injudicious to change the manganese specifications in many of these steels, but some saving could be brought about by paying attention to the residual manganese in the bath. The most constructive work, however, in regard to these steels, and the greatest measure of conservation would be to adopt methods that would utilize the low manganese alloys—methods of adding manganese similar to Mr. Ellicott's:

Melting spiegel in a cupola and adding direct or diluted into the steel ladle.

Adding about 5 per cent manganiferous pig iron from mixer or cupola to furnace or ladle.

We have followed a method of this kind at the Lackawanna Steel Co. for a number of years in making these grades of steel, and a few details may be of interest. For instance, in making rail steel the open-hearth bath is tapped with 0.15 per cent carbon, and an addition of molten spiegel mixture is made in the

steel ladle that will add the desired amounts of carbon, manganese and silicon. The usual practice on rail steel is to charge into the spiegel cupola a mixture of spiegeleisen and pig iron that will average 6.50 per cent manganese, and the usual amount of molten spiegel is 28,000 lb. for a heat giving 100 tons of ingots.

On shell steel the spiegel mixture charged into the cupola averages 9 per cent manganese, and the amount of molten spiegel added to the steel ladle is 14,000 lb. for a heat giving 100 tons of ingots. Such a method is entirely practicable, as may be judged from the fact that we use it in making about 50,000 tons of ingots each month. It does not interfere with output, but on the contrary helps to increase the tonnage, and as regards quality gives material which is remarkably uniform from one ingot to another, which rolls well and which can be confidently subjected to the most rigid tests.

There is no doubt that along the lines of methods similar to ours and of methods given above, the use of ferromanganese can be largely done away with in making these grades of steel, and a conservation of manganese be brought about that will be of great importance, because the low manganese ores of this country can be used in making the alloys required. It may be mentioned that our president, E. A. S. Clarke, has publicly stated that we at Lackawanna stand ready at any time to explain and show our method of using spiegel and to do all we can to enable others to work out similar methods to meet their own conditions.

Prof. Joseph W. Richards, Lehigh University, Bethlehem, Pa., who was the last speaker, said in part:

The use of manganese to fill unnecessary specifications is certainly one which should receive immediate and effective attention. It is a clear waste. A source of manganese for air blast furnaces which is not at present utilized is the slags from spiegel furnaces. These contain considerable manganese and would be self-fluxing in the blast furnace, and a considerable proportion of their manganese saved.

My friend Mr. Pousson of the Stavanger Steel Works, in Norway, confirms the fact that spiegeleisen of quite low grade can effectively replace ferromanganese in most steels, and that calcium carbide can be partly substituted for ferromanganese in deoxygenizing steel. In a recent letter to me he states that 10 to 12 per cent spiegeleisen, or even 8 to 10 per cent, can replace ferromanganese entirely in all grades of rail steel. The spiegel should be melted in an electric furnace to preserve the manganese and keep down the carbon, and not in cupolas. Necessary silicon can be added as ferrosilicon.

For soft steel, such as steel plates, angles, etc., the 80 per cent ferromanganese can be replaced by half its weight of 60 per cent ferromanganese, if calcium carbide is substituted for the other half. For instance, in place of 8 to 12 lb. of 80 per cent ferromanganese, 4 to 60 lb. of 60 per cent ferromanganese is used in conjunction with 14 to 16 lb. of calcium carbide. The latter is used in pieces 0.3 to 0.4 in. in diameter, is mixed with the alloy and thrown onto the bottom of the ladle. The steel is poured upon the mixture, especial care being taken that the steel strikes the carbide before the slag comes in. This is most easy to accomplish when using a tilting furnace. Additional deoxygenation, if required, can be secured by powdered 50 per cent ferrosilicon and aluminum. The exact quantity of carbide to use for any steel can be easily found by a little experimenting.

Calcium carbide can thus be employed to diminish our manganese requirements. Whether it is commercial or not depends on the relative cost of 80 per cent ferromanganese, 60 per cent ferromanganese and calcium carbide.

Employees at the plants of the Youngstown Sheet & Tube Co. plant at East Youngstown, also at the two Hubbard blast furnaces at Hubbard, Ohio, nearly 18,000 in all, have pledged themselves to stand behind the company in its pledge to turn over to the Government 100 per cent of its output, and to produce every ton of material that it is possible to turn out.

A Philadelphia Dinner Tribute to Charles M. Schwab

Not since the Gary dinners of 1908 and 1909 has a larger or more representative gathering of iron and steel manufacturers resulted from the invitation of an individual than that which did honor to Charles M. Schwab at the Bellevue-Stratford, Philadelphia, on Wednesday evening, May 29. The occasion was a dinner given by William H. Donner, president of the Donner Steel Co., in honor of the director general of the Emergency Fleet Corporation. The event was apparently timed to the removal of Mr. Schwab's offices from Washington to Philadelphia and in the company of 300 who were Mr. Donner's guests were many men prominent in Philadelphia commercial and professional life. There was the heartiest approval of Mr. Donner's opinion that no man in the American steel trade is more popular than Mr. Schwab, and at this juncture certainly no more popular personality is in the eye of the American people.

Among those who made up the company were associates of Mr. Schwab in the old Carnegie Steel Co. days, and not unnaturally in the reception preceding the dinner informal comment turned to the striking fact that Carnegie men are now in charge of the country's three important ordnance operations, those at Homestead and Bethlehem and the Midvale plant at Nicetown. It was also natural that comment should run to the splendid response shipyard workers have made to Mr. Schwab's recent visits to the yards, particularly the receptions given him at the Great Lakes shipyards, from which he had but recently returned.

Mr. Donner has not been known as a man given to much speech in the councils of the steel trade and of its great organization, the American Iron and Steel Institute, but his presentation of Mr. Schwab to his guests was highly fitting. His allusion to the great task to which the nation had called Mr. Schwab and the confidence felt in him not only by his compeers in the steel industry but by the entire shipbuilding industry, including the men in the yards, struck a responsive chord in the entire company. Mr. Schwab's response to the enthusiastic greeting of the diners was electrifying. He told how the call had come to him and gave generous recognition of the way in which Messrs. Hurley and Piez had co-operated in the plans recently set on foot. A thought which his hearers applauded was that approval goes much farther than criticism in getting the best out of any organization or out of the workers in any enterprise. He disclaimed being an optimist in the popular conception of the word, or a politician, but his hearers had no doubt of the high faith that inspired every move he has made in Washington when he outlined what had been done and what was planned. An output of 250,000 tons of ships for May, or the best month's work yet done, was the estimate he made and with it he assured his hearers that the May record would prove to be smaller than that of any of the months that are ahead.

Chairman E. H. Gary of the United States Steel Corporation paid a high tribute to Mr. Schwab and commented on present and recently past conditions growing out of the war as these affected manufacturers. Chairman Hurley and Vice-President Piez gave the guests some inside information as to the campaign they conducted which ended in putting Mr. Schwab's experience and rare personality at the disposal of the Government. Judge George Gray, Delaware's distinguished publicist, was called upon and discussed in a spirit of high patriotism the aims of the United States in the war.

At the guest table in addition to those mentioned above were Joseph G. Butler, Jr., John Cadwalader, B. Dawson Coleman, Henry B. Coxe, T. DeWitt Cuyler, George Dallas Dixon, James A. Farrell, Charles C. Harrison, C. E. Ingersoll, Sidney W. Keith, Willis L. King, Charles H. Markman, Randal Morgan, Arthur E. Newbold, Senator Boies Penrose, George Wharton Pepper, Samuel Rea, J. L. Replogle, Hon. William C. Sproul, E. T. Stotesbury, Hon. Charlemagne Tower, Alexander Van Rensselaer.

British Output of Pig Iron and Steel in 1917

Great Britain's pig iron and steel outputs in 1917, while exceeding those of 1916, were not as much larger as had been quite confidently predicted in some quarters. The 1917 pig iron output is published as follows, in gross tons, and is compared with that of 1916:

	1916	1917
Hematite	4,042,014	3,993,374
Basic	2,290,549	3,082,562
Foundry	1,418,824	1,162,982
Forge	899,467	864,759
Spiegeleisen, ferromanganese, ferrosilicon, etc.	291,845	296,524
Direct castings	105,284	20,053
Total	9,047,983	9,420,254

Production in the past 12 years has been as follows in gross tons:

1906	10,149,388	1912	8,889,124
1907	9,923,856	1913	10,481,917
1908	9,289,840	1914	9,005,898
1909	9,664,287	1915	8,793,659
1910	10,217,022	1916	9,047,983
1911	9,718,638	1917	9,420,254

The 1917 output is about 8 per cent less than the average of 1906, 1910 and 1913. If the figures are correct as given, Great Britain has not been increasing its output by new construction to the extent generally predicted. The fact that government authentication for the statistics of 1917 is lacking raises a question as to their completeness. The decided increase in basic iron is indicative of war conditions as to supplies of imported ores.

The steel output in 1917 as compared with 1916 was as follows in gross tons:

	1916	1917
Bessemer:		
Acid	1,096,153	1,059,281
Basic	505,817	602,265
Open Hearth:		
Acid	4,393,004	4,413,843
Basic	3,012,558	3,421,170
Electric:		
Ingots	39,968	57,156
Castings	9,288	11,693
All Other:		
Steel castings	139,669	186,920
Total (exclusive of crucible steel)	9,196,457	9,752,328

There has been a marked increase in basic steel output in 1917, as would be expected from the larger production of basic pig iron. The electric steel output increased 50 per cent in 1917 over 1916.

Bethlehem and Tennessee Company Strikes

WASHINGTON, June 4.—The National War Labor Board, which has taken jurisdiction of the labor controversies at Bethlehem and Birmingham, and which has heard considerable testimony through a sub-board, is planning to send representatives to the plant of the Bethlehem Steel Co. at Bethlehem and to those of the Tennessee Coal, Iron & Railroad Co. and other operators in the Birmingham district to report on certain phases of the situation in each district. The board hopes to have these reports ready for submission at its next meeting on June 12, when it will take up for settlement other pending cases.

Pending the mediation of the National War Labor Board the strikers at Bethlehem and in the Birmingham district have returned to work under an agreement that if an award is made in favor of the men it shall be retroactive, if practicable, to the date when the striking workers left their places.

The Brier Hill Steel Co., Youngstown, Ohio, expects to have its 132-in. plate mill in operation about September, and the 84-in. jobbing mill about a month earlier. The 500-ton blast furnace being built by this company is expected to be ready to make iron in the fall.

AMERICAN ARTILLERY TRACTOR

Will Haul Six-Inch Guns on the Battlefields of France

WASHINGTON, June 4.—In the presence of a distinguished party of public men and diplomats including the Secretary of War, Major General March, the new chief of staff, leading members of the Senate and House Military Committees, and a number of ordnance experts attached to the allied embassies here, a highly successful demonstration was given yesterday of the new five-ton artillery tractor designed for the hauling of field guns on the battlefields of France. The performance of the tractor aroused great enthusiasm on the part of those witnessing the test, several foreign experts present expressing the opinion that the motorization of American artillery promises to excel that of any of the allied armies.

The demonstration of the new tractor, which has been built by the Maxwell Co., was given in a very rough bit of country embraced in Rock Creek Park. Coupled to the tractor was a 4.7 field howitzer weighted to represent a load of five tons. Trailing this gun the tractor, which weighs 9000 lbs., descended and climbed the steepest grades to be found, in some cases negotiating 451-deg. ascents with great ease and without a stop. Although the wheel base of the tractor is comparatively short it apparently experienced no

difficulty in climbing over trunks of trees laid together so as to constitute a 3-ft. obstacle. Young trees 5 in. in diameter in the path of the tractor were bent to the ground without in the slightest degree impeding the tractor's passage. The War Department has ordered a large number of these tractors which will be able to haul 6-in. field guns or several smaller guns.

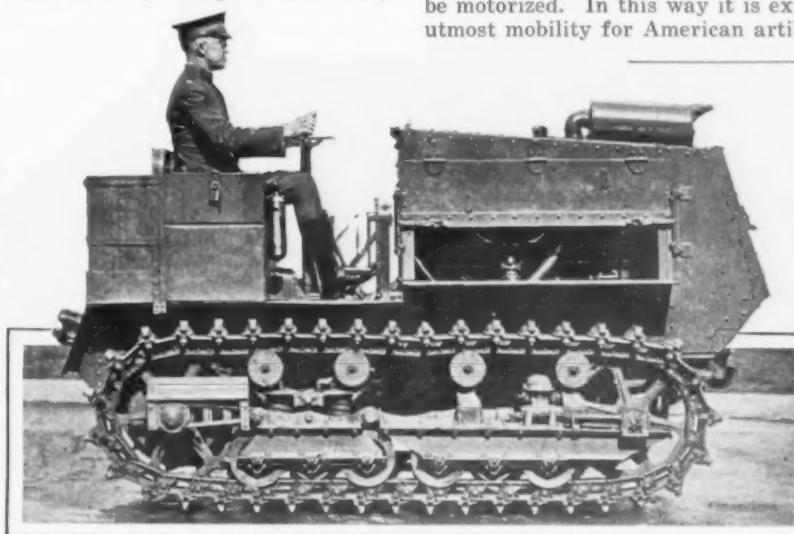
Motorization of field artillery will be carried to a greater extent with the American Army than with any army now engaged in the war. After the first few days of an offensive there has practically always occurred a lull in the fighting, during which the army of the offensive has attempted to bring forward its artillery; while the army on the defensive has either improved its position for defense or has organized a counter offensive stroke. The motorization of field artillery reduces the length of time required to bring forward field artillery and thus gives an important advantage—which might easily prove decisive—to the army possessing superiority in motor equipment. While a horsed regiment of 6-in. howitzers consumes 14.7 tons of forage a day, a motorized regiment, going 50 miles in a day, or twice as far as horses, consumes 4 tons of fuel, oil and grease. Moreover, on a transport, the tractor takes up far less room than 16 heavy draft horses.

The problem of motorization of field artillery is a very difficult one and the great difficulty comes in the motorization of light artillery. This is because the principal problem is to obtain motor equipment which can travel over broken terrain, and negotiate shell holes, through mud, and over wire entanglements at a comparatively high speed. It is not difficult to provide a tractor that will haul the heaviest artillery over good roads, and the lighter artillery must be brought

forward rapidly with advancing troops and must be taken over country that has been badly broken by artillery bombardment and in which the retiring enemy has placed whatever barrier possible.

The basis of all tractors for such work was the agricultural caterpillar tractor. The British scored heavily with their use of the caterpillar tractor in the form of the "tank." However, when applied to the transport of field artillery, the farm tractor showed decided limitations. Its engine was not efficient for military use, as there was no necessity for developing a very efficient engine for a tractor in agricultural work. Its body was of greater length than the caterpillar track on which it ran, and thus when it went into a shell hole it would frequently run its frame into the mud and could not easily extricate itself. It was unwieldy, slow, and not sufficiently reliable for artillery transport purposes.

Exclusive of the heaviest field artillery mounted on railroad carriages, all American artillery will be motorized with the exception of 3-in. gun batteries. As a matter of fact, certain of the 3-in. gun batteries will be motorized. In this way it is expected to achieve the utmost mobility for American artillery.



Five-Ton Artillery Tractor, Successfully Tested at Washington Monday, June 3

At the plant of the Warren Steel Casting Co., St. Louis, recently, a flag raising was held attended by all employees and officers and an address was made by the president, C. E. Hayden. This company had a 100 per cent subscription from its employees to the Red Cross, the total amount given aggregating approximately \$6,500.

Barred Industrial Zone

The Fuel Administration, Washington, has established the first barred industrial zone to include New England, eastern New York, New Jersey, eastern Pennsylvania and Delaware, and in which the construction of new factories and manufacturing plants will be prohibited unless of the most urgent character. The line bounding the district is marked by Schenectady, N. Y.; Binghamton, N. Y.; Williamsport, Pa.; Altoona, Pa.; Harrisburg, Pa., and Baltimore. Orders to confer with the director of distribution of the Fuel Administration have been issued to prospective manufacturers.

The Removable Horseshoe Calk Manufacturers voted May 20 at Atlantic City to organize under the Hardware Manufacturers' Organization for War Service, developed by the American Hardware Manufacturers' Association. The organization is in charge of a committee comprised of Warren D. Chase, president Rowe Calk Co., Plantsville, Conn., chairman; Otto Swanstrom, president Diamond Calk & Horseshoe Co., Duluth, Minn., and W. J. McCurdy, secretary Neverslip Mfg. Co., New Brunswick, N. J.

The Tennessee Coal, Iron & Railroad Co. has placed with Freyn & Co., engineers and contractors, People's Gas Building, Chicago, an order for additional Birkholz-Terbeck burners, making the third order placed for such equipment. Freyn & Co. now have in operation or contracted for at blast furnaces and steel plants, inclusive of coke oven operations, 693 blast-furnace and coke-oven gas burners covered by the Birkholz-Terbeck patented construction.

OVER 6,000,000 TONS OF SHIPS

Director General Schwab Plans for a Great Increase in the Coming Year

WASHINGTON, June 4.—Director-General Schwab of the Emergency Fleet Corporation is now contemplating a total output of the shipyards of the country aggregating more than 6,000,000 tons during the fiscal year beginning July 1, next. If methods can be devised for preventing the usual slowing down of production during the winter months, the coming fiscal year may witness the completion of no less than 8,000,000 tons. By July 1 the regular combined output of all the yards will have reached 500,000 tons per month, according to Mr. Schwab, and the monthly construction thereafter is expected to increase steadily.

The unqualified success of the plan of building fabricated ships, which was demonstrated in the launching of the Agawam at the Newark Bay plant of the Submarine Boat Corporation on May 30, has gratified Mr. Schwab as has no incident since he assumed the duties of his official position. The progress recently made at Hog Island yard has also proved highly satisfactory and Mr. Schwab therefore announces that he intends to build two large steel fabricating plants near Philadelphia with a view to maintaining an even flow of steel to Hog Island and the other yards building fabricated ships. So enthusiastic are the officials of the Emergency Fleet Corporation over the success of the fabricated ship plant that they have authorized the following statement concerning the work done on the Agawam:

When it was proposed to build ships of ordinary structural steel plates and shapes, used heretofore only in the construction of bridges, office buildings and super-structure, fabricated as completely as practicable in steel shops throughout the country and then assembled in the shipyard into a complete vessel, skeptics said it couldn't be done.

There were too many difficulties, they pointed out. If plates were to be rolled and punched in Pittsburgh and Youngstown, to be joined together by rivets in a shipyard somewhere else, these doubters saw endless mistakes and wastage. The holes wouldn't fit, they argued, and the whole scheme would collapse.

There was evidence, too, to support these pessimistic predictions. American labor, then, was not mobilized for war. There was a great deal of lassitude, if not actual indifference, in the steel mills. Expert workers were scarce and the infinite plans necessary for proper fabricating of ship steel presaged many and difficult problems.

But the work was standardized, workmen throughout America responded nobly to the nation's need, and by the time the Submarine Boat plant was ready to begin building ships, the fabricated stuff was on hand. Now the entire work is so organized that officials are hopeful that the program will move along according to the schedule worked out when all plans were on paper.

Here is what actually happened in the case of the Agawam. Officials of the company say that 90 per cent of the punches were perfect. That is, only 10 per cent of the holes on different plates which were meant to be joined together failed to meet square to measure. Of the 90 per cent perfect plates, no reaming was necessary. Only a small fraction of the remaining 10 per cent afforded more trouble than is met ordinarily in shipbuilding, where the fabricating and assembling is done in the same plant.

Delivery of steel ships under the Emergency Fleet Corporation program passed the first 1,000,000 dead-weight tons during the past week. While these ships are chiefly vessels requisitioned by the shipping board while on the stocks, the total to June 1 is ~~now~~ in excess of the aggregate tonnage built in this country in any previous year, 620,000 tons being the record up to the date of the entry of the United States into the war.

Chairman Hurley announces that a plan has been prepared by Charles M. Schwab, director-general, and by Charles Piez, vice-president, to provide Government recognition of distinguished services both by whole organizations of ship workers and by individuals. Mr. Schwab has been spending most of his time actually in the shipyards, getting in touch with the men and the foremen and superintendents. He has stated that the spirit of the workers is one of patriotic fervor and that they are placing the national need above all

personal consideration. He believes this spirit should be recognized. A competitive board has been created, which will decide upon the awards and determine the giving of the flags, badges and medals. There will be three methods of rewarding unusual and patriotic performances in the shipyards. First will be the awarding of a series of flags to the individual plants; second, there will be service medals to the shipyard employees; third, silver and gold medals will be awarded individuals who perform distinguished service of any sort.

Germany and American Copper

In an article on "Sources of Strength That Have Not Yet Dried Up," Dr. Felix Pinner, who writes on economic subjects for the *Berliner Tageblatt*, deals with the future effects on German trade of the intervention of the United States in the war. He recalls that in 1913 the United States exported 200,000 tons of copper to Germany and asserts that since the beginning of the war the copper production of the United States has almost doubled owing to the demand for munitions for the Allies. When this war demand has ceased, he argues, there must inevitably be an over-production of the metal in the United States, and no political enmity will induce the manufacturers under such conditions to refuse to deal with such a good customer as Germany. On the contrary, they will be in a hurry to recapture the German market, if for no other reason than to put a stop to the great development of substitutes which, owing to the scarcity of copper during the war, has made such rapid strides in Germany. In all of these observations the wish is plainly father to the thought and the probability that the United States and its Allies will supply the world trade in copper products which heretofore has looked to Germany is entirely ignored.

Taylor-Offutt Coal Co. Organized

The Taylor-Offutt Coal Co., with main office at 300 Chestnut Street, Philadelphia, and branch offices at Oakland, Md., has been incorporated under the laws of Maryland to develop a new coal field in Garrett County, Md., near Oakland. The company will operate under a lease from the Offutt estate, the owner of the property, and expects to be mining coal from a 4-ft. Freeport seam about August 1. The output of the mine will be taken by the N. & G. Taylor Co. works at Cumberland, Md., for use in the manufacture of high grade steel and tin plate. The officers of the company are: President, Hollinshead N. Taylor, N. & G. Taylor Co., Philadelphia; vice-president, William R. Offutt, Oakland, Md.; secretary, Julius C. Renninger, Oakland, Md.; treasurer, Wm. W. Justice, N. & G. Taylor Co., Philadelphia.

The development of the property is in charge of N. Allen Stockton, Real Estate Trust Building, Philadelphia, as consulting mining engineer. The mine is located at Offutt Station on the main line of the B. & O. R. R. several miles west of Oakland.

April Imports of Ferromanganese

Ferromanganese imports in April were 2575 gross tons, which compares with 3555 tons in March, 1417 tons in February and 1050 tons in January. The April, 1917, imports were 6846 tons. The total for the 10 months ended April 30, 1918, was 23,382 tons, against 67,905 tons to April 30, 1917. The April imports of 2575 tons were distributed as follows: 1434 tons through the port of Baltimore, 850 tons through Philadelphia, 291 tons through New York, and none at New Orleans or Norfolk.

Exports of ferromanganese in April were 504 tons, bringing the total for the 10 months ended April 30, 1918, to 4138 tons.

A fourth-class post office is to be established at McDonald, Ohio, the new town to be built by the Carnegie Steel Co., in connection with its new bar and band mills being built at that place.

NEW STEEL MILL COMMUNITIES

Treatment of Housing Problems at Youngstown and the Clairton By-Product Plant

The distinctive features and diversity of treatment being undertaken by some of the steel companies in solving their industrial housing problems have been outlined in a recent discussion of this subject before the Engineers' Society of Western Pennsylvania. In connection with its McDonald bar mills, 8 miles outside Youngstown, Ohio, Fred Hubbard, construction engineer of the Carnegie Steel Co. for that district, described its latest scheme involving a group of nearly 250 dwellings.

About 550 acres, located on a hill opposite its plant, were purchased. A plan was adopted calling for a street lay-out of 60-ft. avenues and 50-ft. streets, with a 150-ft. boulevard for its main street. The houses are for the most part frame construction with some stucco over frame and quite a number of "Fisklock" brick and a few brick veneers. They are mostly four, five and six-room houses. It was found that if a house larger than four rooms was designed it would be possible to make out of it a six-room plan in which could be gotten very desirable features, such as three bedrooms and dining room. The Carnegie Steel Co. has perhaps gone far in sanitary installation, putting in complete up-to-date improvements, including electric lights, bathroom equipment, cement cellars and concrete laundry trays, and the houses are complete in every detail and perfectly fit to be occupied by any American workman. In fact, the houses under construction at the present time will be occupied mostly by American workmen and the better class of foreigners.

In the construction work the so-called ready-cut system was tried out, having a mill in the field in which to cut the house frames. It was found to be economical to cut the entire frame at the mill and send it up to the job with the pieces marked, thus eliminating a great deal of hand work in the field. But to carry this system further has not been found economical. The company, therefore, established what was called ready-cut frames in the building operation, and eight or ten houses all of the same design are cut at one time at the mill. Differences in architectural features are used to relieve the monotony and by properly distributing houses of the same type a very satisfactory general appearance is obtained.

In painting and interior decoration creosote oil has been used in the priming and staining coats. The exterior trim is mostly cypress and redwood; the interior trim, yellow pine and oak. All trim before leaving the lumber yard is given a priming coat of a mixture of creosote oil to which has been added about 2 per cent of linseed oil and a certain quantity of zinc and coloring pigments. The interior finish also receives one coat of shellac before it leaves the lumber yard. All interior woodwork is given one coat of creosote stain, two of shellac and one of wax. This, it is believed, will make a very desirable finish as well as a very pleasing interior effect. The waxed finish does not show up the scratches and marks usually received from hard usage as plainly as a varnish finish. Plaster board called "Bestwall" is being used in all frame houses on which the decoration is done direct with flat wall paint, the walls being mottled and the ceiling a plain color.

The houses are equipped with soft-coal burning, hot-air heating furnaces. It is estimated that they will cost complete from \$3,200 to \$3,600 or \$3,800, and some it is proposed to build later that will run as high as \$5,000 to \$6,000. They will rent for, probably, from \$20 to \$30 per month.

Two new developments being carried out by the Buckeye Land Co., a subsidiary of the Youngstown Sheet & Tube Co., contrast the radical difference in treatment of housing for native and for foreign workers. One of these is a tract of 219 acres on the south side of the Mahoning River, and known as Loveland Farms. It will be divided into approximately 1000 lots, of irregular shape and size on account of the winding streets to which the gently rolling surface adapts itself.

The property being outside the limits of Youngstown, makes it necessary for the company to arrange for all domestic services. There are now 100 detached frame dwellings under construction, the first of which should be ready for occupancy early this spring. The houses average 26 ft. square, mostly full two-story, and will be equipped with bathrooms and hot-air furnaces. These properties will be sold to employees on easy terms.

On the north side of the river, and just outside the limits of the village of East Youngstown, on a tract of 40 acres, a workingmen's colony of concrete houses for 146 families is under construction. It consists of attached or terrace houses with accommodations for from two to eight entirely separated families in each building. Houses are equipped with basements and bathrooms, and are intended to rent to foreign families whose weekly income is from \$20 upward. Houses will be three and four rooms each and will be ready this spring. The ultimate number of families on this tract will be about 700. The rate of rent has not yet been determined.

The same plans used at its McDonald plant were also used by the Carnegie Steel Co. for its Wilson town-site, where about Jan. 1 it planned to employ about 1500 more men in its Clairton by-product coke plant nearby. The tract contains about 90 acres in the immediate vicinity. The ground is very steep and very irregular, according to W. H. Lauman, assistant chief civil engineer, Carnegie Steel Co., so that the engineers were compelled to get away from the rectangular layout of streets and have followed contours to get usable grades. The plan shows nearly all streets as curves and hardly two lots of the same dimensions. This was a matter of necessity rather than a question of beauty.

All foundations are of concrete and the houses vary in construction, some being siding, "Fisklock," stucco, or shingle, all having, however, slate or asbestos roofs. Efforts have been made to get away from the regular row construction of the coal company type, and 10 or 12 different designs, each having three exterior treatments and colors, have been employed. The Carnegie company is building about 235 houses, and will probably construct more in the near future. The houses are of rather high grade for the ordinary workman, having baths, laundry trays, furnaces, cooking stoves, electric lights, etc., and will be rented at a reasonable rate. The employees can purchase their homes if they so desire.

The houses were designed with the idea of making it as hard as possible for more than one family to occupy one house, the entrances being constructed with that in view. The company felt that the mixing up of families or taking of boarders should be discouraged, although in the early stages of the by-product work it will be necessary to use all houses to capacity.

Data on Modern Foundry Available

An illustrated booklet prepared for distribution by Frank D. Chase, Inc., industrial engineer, People's Gas Building, Chicago, contains an address entitled "The Modern Foundry," by Frank D. Chase, which was presented before the Philadelphia Foundrymen's Association, March 6, 1918. Mr. Chase reviews all that a strictly modern foundry should embrace as well as the factors that should be considered in determining the location of a foundry plant. Several half-tone illustrations are given of interiors and exteriors of foundries, as well as line drawings showing desirable layouts. In short space a great deal is told of the ideal foundry.

The total number of Japanese citizens living abroad was 450,773 at the end of June, 1917, according to figures issued by the *Japan Gazette*. This is an increase of 50,357 in the year. The United States was credited with 151,606 men and 76,572 women, the most in any country. Manchuria and Kwantung ranked next with 60,492 men and 51,766 women. Brazil had 3050 men and 2688 women with 24,235 men and 2621 women in other South American countries.

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War Steel Requirements

As to the future of war steel needs, a long range view is helpful in making an appraisal. The viewpoint of nine months or a year ago was in essence that there were certain iron and steel fabricating and other consuming instrumentalities which were to be devoted to war work and when the iron and steel producing industry had supplied as much material as these consuming activities could absorb its quota would be filled. The percentage of output was variously estimated, generally at between 15 and 25 or possibly 30 per cent.

Somewhat later the view was entertained that a considerable part of the steel that was being called for in connection with the war would be required but once—steel to build and equip the army cantonments, the shipyards, some warehouses, and other items. When those requirements were met there would be, in that respect, a diminution of the total of war steel needs.

To-day the position is totally different. It has been learned that when the country devotes itself entirely to the work of winning the war it can fabricate and put to war use a great deal more steel than in the early months was thought possible. Military conditions, moreover, have dictated: the Russian collapse and the 1918 drive on the western front.

The country finds itself in the position in which American steel works have often found themselves. When a works has had an excess of ingot capacity over blooming mill capacity it did not allow some of the open-hearth furnaces or Bessemer converters to be idle; it provided more blooming mill capacity. The backward departments were brought up. The forward departments were not curbed.

"Force, force to the uttermost," means that if we have more steel than we have shell factories, shipyards and the like, then we must build more of the latter, not decide that we have an excess of the former. Force to the uttermost means that we have no excesses anywhere; we have nothing but deficiencies, which we must strive to make up.

Every ton of steel used for the building of a gun plant means tons of steel later to be converted into guns in that plant. Every ton of steel converted into a gun means tons of steel in future to make shells or projectiles for that gun. Every ton of

steel spent in shipyard construction means tons of steel later for building ships in that yard. Every ton of steel put into a vessel means many tons of steel in future cargo for that vessel to carry to the battle front.

If we win this war at all, and not to win is unthinkable, we can only win if among other things we make the American steel industry with its 45,000,000 or 50,000,000 tons of steel ingots a year reach with every ton and every ingot toward Berlin. Every ton must help. If there is no means now for its helping, it is not a surplus ton, it is a ton waiting for means to be provided whereby it can help, be its "bit" individually ever so little, in the shell factory, the gun plant, the shipyard, in railroads in France, in railroads in the United States, on farms in France and Britain and on farms in the United States. Work must be found for every ton.

The Steel Institute Meetings

A suggestion to the directors and the program committee of the American Iron and Steel Institute:

Seeing that all the papers and discussions presented at the institute meetings are promptly published in the iron and steel trade journals and are available later in the annual volume of the institute, the time given up to the reading of papers at the meetings might well be shortened. Technical papers and particularly such as deal largely with quantities or with statistics and diagrams, cannot be taken in by a listener. They require study. No paper of this character should be given 45 minutes of the valuable time of an institute meeting.

That nearly a thousand men journeyed to New York for the annual meeting held at the Waldorf-Astoria last Friday indicates how highly the industry regards these gatherings. Heads of the steel companies and men of every rank in the operating and selling organizations come together in this way to meet their friends, to find out the trend of things in the industry and how best to plan for the future. In the years of their association, the members of the institute have formed strong attachments. Their numbers have increased greatly. It has come about that the interchange of views, as men meet outside the formal sessions, is now the most valued feature

of these occasions. The technical papers have been of rare excellence, but only a third of those in attendance hear them. This fraction is as large, it is true, as that which usually listens to papers read at engineering society meetings; but the fact remains that the social and business interchanges of the corridors are what most of the members come for. Judging the future by the past, we venture to say that two or three technical papers pointedly presented in synopsis and discussed briefly, and one or two papers dealing with economic or trade questions would make a popular program and secure a larger hearing. At all events, a referendum on the subject might yield suggestions which the leaders of the institute would gladly entertain.

Centralization Checked

The tendency toward centralization in the United States, which has been so marked during the past year, not only in war measures, of which the taking over of the railroads by the Government is the most conspicuous example, but also by legislation in Congress threatening to almost obliterate State lines and rob the States of all power in important matters, has received a decided check in the decision in the child-labor case. The decision is especially important because the child-labor law is only one step in the program which aimed to prevent shipment across State lines of products of factories and mines unless the owners complied with national laws. Although, of course, the court passed upon only the law which was before it, Senator Kenyon of Iowa, a leader of the so-called radical group of Senators, frankly admits that the decision closes the door firmly against many of his plans, while leading Socialists denounce it as reactionary. In spite of the adverse criticism, much of it due to the fact that child-labor legislation was involved, it is hard to see how the position of Justice Day, that "the power of the States to regulate their purely internal affairs by such laws as seem wise to the local authorities is inherent, and has never been surrendered to the general Government," can be successfully controverted. A part of the program was to prevent interstate commerce in the products of any plant, unless safety appliances had been installed, and laws in regard to fire escapes and other subjects of police powers were to be added to the national statutes. In other words, State legislatures would have been rendered impotent.

The unfortunate feature of this decision is that the court was so nearly equally divided. The four dissenting justices, Holmes, McKenna, Brandeis and Clarke, are from the North, two being radical Democrats and two conservative Republicans; while three Republicans from the North united with two Democrats from the South in taking the State's-rights view of the case. In another recent decision of the highest importance, that rendered in the case against the United Shoe Machinery Co., the court divided four to three, with two justices not participating. With the balance so nearly even, as in these two cases, the decisions may be reversed at any time. We believe, however, that both decisions will grow in favor. On the one hand, the dangers of centralization of power by the National Govern-

ment will be more fully realized as time passes; and on the other hand, the folly of attempting to disintegrate great companies, unless their acts are against the public interest, will be better appreciated.

Steel from the Electric Furnace

Attention has been directed again to the remarkable progress in electric steel in the United States. The world's largest electric steel plant at South Chicago is now, or soon will be, producing 200,000 tons per year, whereas the entire American industry in 1917 produced 234,000 tons of electric steel ingots, or nearly double the 1916 output.

This measure of the country's advance was brought out at last week's meeting of the American Iron and Steel Institute. The paper by Vice-President Robinson of the Illinois Steel Co., with its presentation made more vivid by unusual motion pictures, was a revelation as to the status and possibilities of the electric furnace and a notably clear discussion of its metallurgical and other phases.

The figures given above do not include the steel casting output. In 1916 this was 42,870 tons. There is good reason to believe that it was more than double this in 1917 due to unusual war requirements. If so, the total electric steel output in 1917 was at least 315,000 tons. It is safe to say that in 1918 it will reach 500,000 tons and may go higher. The entire steel output of the United States 40 years ago was only 500,000 tons, while in 1909 the electric steel production was but 13,700 tons. Thus far in 1918 at least 28 new installations have been arranged for, making the total of electric furnaces in this country now nearly 265, as compared with 136 on Jan. 1, 1917, and it is not unlikely that the total at the end of the year will approach 300 furnaces.

Will electric steel solve the rail problem? It is too early to answer with confidence. The triplex plant demonstrates that it is possible to produce quality steel in quantity and that is a first step toward electric steel rail production. The fact that electric steel is tougher at low temperatures than any other, as demonstrated at South Chicago, argues for its use in rails, in airplanes and other products where vibration and shock at low temperatures are important factors in the problem.

While Mr. Robinson's paper is an argument for the electric refining of hot metal as the greatest field of the electric furnace, steel castings and tool steel must not be overlooked. In high-grade small castings the electric furnace demonstrated, early in its history in this country, its efficiency and value. The remarkable strides in American tool and high-speed steels since the war started are due solely to the electric furnace, and the extent to which we shall be independent of Germany and Great Britain after the war in such steels is bound up with electric furnace progress and efficiency.

In these days of manganese and alloy conservation, it should not be overlooked that not only is less than half as much manganese necessary in making electric steels but also a great saving is possible in chromium, vanadium and other alloys.

In quantity production of electric steel this is an important consideration.

"Safety cannot be measured by price, and public opinion will more and more insistently call for the highest excellence in the automobile, the airplane and other forms of fabricated material." This prophecy of Mr. Robinson already is on the way to its realization and there is no longer need to speak guardedly of the future of electric steel, especially if Government aid is afforded American hydroelectric developments.

The Controlled Prices

Within three weeks it is necessary for the War Industries Board to determine the maximum prices that shall rule for iron and steel products after June 30. By an announcement late in March the existing prices were extended for the three months, April, May and June, with the exception that iron and steel scrap was reduced \$1 a ton, basic pig iron \$1, and Bessemer iron \$1.10.

It is important to note that while the machinery of price fixing is composed of the same parts as formerly, its operation is somewhat different. The original arrangement, announced Sept. 24, 1917, was in the nature of a mutual and voluntary agreement. In large measure a compromise was represented, the War Industries Board conceding slightly higher prices than those it had in mind as properly applicable to the products the Government was authorized by law to buy at its own prices, in return for the producers making the great concession of permitting the same prices to apply on the very much larger purchases made by the public.

To-day the condition is quite different. The Government's purchases are very large, representing much more than one-half the output, perhaps nearly all of it. The concession the industry makes in allowing the controlled prices to apply to purchases by the general public is greatly reduced in importance, and indeed it almost disappears, seeing that if deliveries to ordinary commercial consumers are sanctioned at all they are likely to be made upon contracts entered into before the set prices were made to apply. Conditions are now such that the Government would not have to strain a point to justify its commandeering the plants, and thus it has full legal power to act. It is not under the necessity of seeking an agreement as it was last September.

Happily, all such discussion as this is purely academic. The iron and steel industry has given itself wholeheartedly to the work of rendering the very best service to the Government of which it is capable, better service than it would have energy to give its customers for the greatest conceivable pecuniary reward. The men in the iron industry, like the men in other industries, are working vastly harder to help win the war than they could be induced to work in hope of pecuniary reward.

It has been made plain that advances in the controlled prices, whether in iron and steel, or in other commodities, are to be allowed only when a strong case is made out that an advance is imperative. In the case of iron and steel a general reduction for the present three-months period was avoided at the last adjustment chiefly by reason of the

fact that on account of the very severe restriction in output in January and February, caused by traffic conditions, the profits in the industry were greatly reduced, and in some quarters the appraisal of the adjustment was that the industry was to be given a period of three months' grace, during which large output and more economical operation was to be expected. Such expectations have been justified, for the output has been rather in excess of the forecasts.

The chief arguments for an advance in prices are two in number—higher wages and increased freights on raw and intermediate products. The wage advance of October, 1917, will hardly be considered, since it was referred to, as a prospect, when the original price understanding was reached. The 15 per cent advance of last April is clearly to be considered, and means about \$2 a ton when translated into terms of finished steel prices.

The freight advances, 30 cents per gross ton on iron ore, two cents per 100 pounds on limestone, 20 cents on coal now taking rates between 50 and 99 cents, 40 cents on coke now taking rates between \$1 and \$1.99, and various other advances, represent at least \$2 per ton on finished steel products. Perhaps, however, there is room for the argument that to use this increased production cost as an offset to a reduction in selling prices is in essence a passing of the item on to the buyer of steel, when there are advanced rates on finished-steel products that the buyer must pay in any event. The advanced freight rates are imposed to prevent drawing on the Federal treasury to make good the guarantee to holders of railroad securities and to draw the money from the treasury through another channel does not really help a great deal.

In the last analysis it is necessary to get back to first principles, that the controlled prices must be such as to stimulate production, to bring about the greatest possible activity in the industries that are helpful directly or indirectly toward winning the war. In this connection the argument is much stronger than formerly. A year ago there appeared no necessity for stimulating steel production to the last ton. If a third of the productive capacity was squeezed out through operations proving unprofitable the remaining two-thirds of the capacity seemed to promise more steel than the Government could possibly use. Nowadays the demand is for the last ton the industry can produce, working with the utmost efficiency and energy in every part—every blast furnace, small and large, every open-hearth furnace, every Bessemer converter, being required if it can be operated.

As to profits for taxation purposes, that is an arithmetical question. If the Government buys 20 per cent of the steel, and the public 80 per cent, and the excess profits tax is 40 per cent, the Government fares better the higher the prices are. It makes a net profit, paying more for its steel but collecting still more in taxes. If the Government buys 75 per cent of the steel, and the public 25 per cent and the excess profits tax is 50 per cent, the Government experiences a net loss through high prices for steel, but this fact does not interfere with the argument that profits should be assured all along the line, to the smallest producers as well as the larger.

OBITUARY

EDWARD C. MEIER, president of the Heine Safety Boiler Co., died May 7, aged 48 years. His death was sudden, occurring after the conclusion of an address which he delivered at a meeting of the district production division of the Emergency Fleet Corporation at the Racquet Club, Philadelphia. Mr. Meier was the son of the late Col. Edward D. Meier, founder of the Heine Safety Boiler Co., and at the death of his father in 1916 he succeeded him as president. He was born at Wyandotte, Kan., and was educated in the public schools of St. Louis. At an early age he started work for the Heine Boiler Co., and entered the sales department of the company in 1895, when the Philadelphia office was opened. When the company decided to establish its own Eastern shop in 1899 at Phoenixville, Pa., he took charge, a post which he held until his death.

EDWARD C. MEIER

ARTHUR R. TRENCH, business manager of the *American Metal Market*, New York, for several years, and second son of C. S. Trench, of C. S. Trench & Co., metal brokers, was accidentally drowned at Camp Petawawa, Canada, June 1. Mr. Trench enlisted in the Canadian Field Artillery May 1, 1917, and was promoted to a sergeancy in a few months. With many others of like rank, he was being retained in Canada for drilling recruits. He leaves his wife and three young children. The fortunes of war are illustrated by the fact that his younger brother, Stewart P. Trench, who has been in service since enlistment in the Royal Field Artillery in November, 1914, has not been incapacitated for duty except by an attack of neuritis, having now reached the rank of captain and being awarded the military cross for services in the spring drive of this year.

LESLIE HENRY COLBURN, general manager Colburn Machine Tool Co., Franklin, Pa., died at his home in that city May 26, aged 51. Mr. Colburn founded the Colburn Machine Tool Co. in 1901 after going to Franklin from Toledo, Ohio. He was the inventor of the Colburn keyway cutter, a high speed heavy duty drill press, and other machine tools. His artistic eye, mechanically trained by years of practical experience, gave a finish of beauty and strength to every detail of machine design which passed his inspection. No problem, mechanical or otherwise, was too insignificant to be treated in other than a serious manner, for he always considered its successful solution required the utmost care in the development of the minor as well as the larger phases.

GEORGE W. RETBERG, secretary of the Canonsburg Steel & Iron Works, Canonsburg, Pa., died at his home in that place on May 24. After the Parkersburg Iron & Steel Co., Parkersburg, W. Va., was organized, Mr. Retberg was connected with it for a time as assistant manager. Later, with John F. Budkee and others, he formed the Canonsburg Steel & Iron Works, of which he had been secretary for some years.

HARRY K. MYERS, consulting engineer of the Kittanning Iron & Steel Co., Kittanning, Pa., died Wednesday, May 29, in Cowanshannoc. Mr. Myers was a graduate of Lehigh University and was formerly consulting engineer with the D. J. Kennedy Co. He was an expert mining engineer, and at the time of his death

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was operating the Cowanshannoc mine for the Kittanning Iron & Steel Co.

EDWARD J. DRAVO, a leading Pittsburgh business man, and who retired from active business life many years ago, died at his home in Sewickley, Pa., on May 27. At one time Mr. Dravo was vice-president and a director of the Pittsburgh Gage & Supply Co.

GEORGE W. FORD, Cleveland, one of the two partners in the Cleveland Planer Works from the time of its organization in 1903 until about a year ago when the plant was sold, died June 2, age 52 years. He had been in ill health for about a year.

JAMES J. MASSEY, for many years proprietor of the Massey Iron & Metal Works, Baltimore, and who at one time was connected with the Monumental Iron Foundry, died at his home in Baltimore on June 2, aged 56 years.

HARRY S. FATE, president J. D. Fate Mfg. Co., Plymouth, Ohio, died May 26 after an illness of several months' duration, age 43 years.

Furnace May Close Down

The Chattanooga Iron & Coal Corporation, through its president, C. E. Buek, makes the statement that unless an increase is made in the agreed price of pig iron at the next adjustment, which is to become effective July 1, the company will blow out its furnace at Chattanooga, Tenn. The recently announced advance in freight rates, it is stated, will make operation unprofitable for this and for other furnaces.

The tandem plate mill being built by the Youngstown Sheet & Tube Co., Youngstown, Ohio, by the Mesta Machine Co., of Pittsburgh, is expected to be ready for operation in August or early September. About the same date, the company expects to finish the building of 102 Koppers by-product coke ovens, giving it a total of 306 ovens, with a total daily capacity of close to 4000 tons of coke.

John E. Fitzgerald has purchased the interest of James A. Bradley, his partner, in the Bradley Machinery & Supply Co., 229 First Avenue, Pittsburgh, and has terminated the partnership.

GREATER PIG IRON OUTPUT

Ferroalloy Production a Record

Daily Rate of Output Exceeded Only in October, 1916—Net Gain of Five Stacks

The pig iron production in May was 3,446,412 gross tons as compared with 3,288,211 tons in April. The daily rate for May was 111,175 gross tons as against 109,607 in April, and is the highest daily rate with the exception of October, 1916, which was 113,189. A total of 54,633 gross tons of ferromanganese and spiegeleisen was produced, exceeding all records. Nearly 40 per cent of this was spiegeleisen. The net increase in active furnaces was five, 15 being blown in and 10 blown out.

Output by Districts

The accompanying table gives the production of all coke and anthracite furnaces in May and the three months preceding:

Monthly Pig-Iron Production—Gross Tons

	Feb.	Mar.	Apr.	May
	(28 days)	(31 days)	(30 days)	(31 days)
New York	153,184	186,908	214,179	237,044
New Jersey	15,616	16,103	22,518	24,339
Lehigh Valley	93,502	117,161	111,312	115,069
Schuylkill Valley	46,600	74,256	89,059	91,751
Lower Susquehanna and Lebanon Valleys	38,094	69,691	66,730	76,316
Pittsburgh district	472,904	656,273	665,665	695,794
Shenango Valley	113,940	157,875	168,056	177,911
Western Pennsylvania	137,576	198,843	203,344	199,604
Maryland, Virginia and Kentucky	76,328	98,163	93,561	96,472
Wheeling district	61,547	112,106	123,211	134,234
Mahoning Valley	226,469	301,863	306,317	330,627
Central and Northern Ohio	188,423	265,710	266,476	286,568
Southern Ohio	54,579	66,794	65,522	67,853
Chicago district	295,398	506,036	530,310	543,409
Mich., Minn., Mo., Wis., Col. and Wash.	106,660	122,323	119,663	125,437
Alabama	209,586	228,988	208,820	210,671
Tennessee and Ga.	28,993	33,998	33,468	33,413
Total	2,319,399	3,213,091	3,288,211	3,446,412

Among the furnaces blown in were one Donner in the Buffalo district; Macungie and Hokendauqua in the Lehigh Valley; Worth in Schuylkill Valley; Edith and one Isabella in Pittsburgh; Alleghany and Goshen in Virginia; Mingo and Steubenville in the Wheeling district; Niles in the Mahoning Valley; one National

Tube in Ohio; Union in Hanging Rock; Philadelphia and Gadsden in Alabama.

The list of furnaces blown out include Palmerton in Lehigh Valley; Brooke in Schuylkill Valley; Farrell and Stewart in Shenango Valley; Colonial in western Pennsylvania; Buena Vista and Oriskany in Virginia; Mattie in Mahoning Valley; Tuscaloosa in Alabama.

Daily Rate of Production

The daily rate of production of coke and anthracite pig iron by months, from May, 1917, is as follows:

Daily Rate of Pig-Iron Production by Months—Gross Tons		
	Steel Works	Merchant
May, 1917	77,561	32,677
June	76,805	32,197
July	76,440	31,380
August	71,436	33,336
September	73,290	31,175
October	76,664	29,886
November	77,135	29,724
December	66,605	26,392
January, 1918	55,662	22,137
February	56,938	25,897
March	74,526	29,122
April	79,199	30,408
May	81,238	29,937
		111,175

Production of Steel Companies

Returns from all furnaces of the United States Steel Corporation and the various independent steel companies show the following totals of steel-making iron month by month, together with ferromanganese and spiegeleisen. These last, while stated separately, are also included in the columns of "total production."

Production of Steel Companies—Gross Tons					
	Spiegeleisen and ferromanganese				
	Total production				
Jan.	2,251,035	2,244,203	1,756,203	24,866	38,792
Feb.	2,183,845	1,829,846	1,620,254	23,877	32,137
Mar.	2,365,116	2,285,430	2,349,419	29,388	36,563
Apr.	2,316,768	2,370,937	2,411,488	31,862	39,595
May	2,408,890	2,404,380	2,513,577	35,844	37,701
June	2,295,784	2,304,155	2,304,155	38,597	30,829
July	2,306,303	2,369,630	2,369,630	31,353	43,884
Aug.	2,313,122	2,214,513	2,214,513	33,338	39,492
Sept.	2,309,710	2,198,705	2,198,705	29,451	42,235
Oct.	2,530,806	2,376,589	2,376,589	34,566	48,691
Nov.	2,404,210	2,349,445	2,349,445	44,975	34,688
Dec.	2,294,620	2,054,659	2,054,659	43,470	29,902

Capacity in Blast June 1

The following table shows the number of furnaces in blast June 1 in the different districts, also the number and daily capacity in gross tons of furnaces in blast May 1:

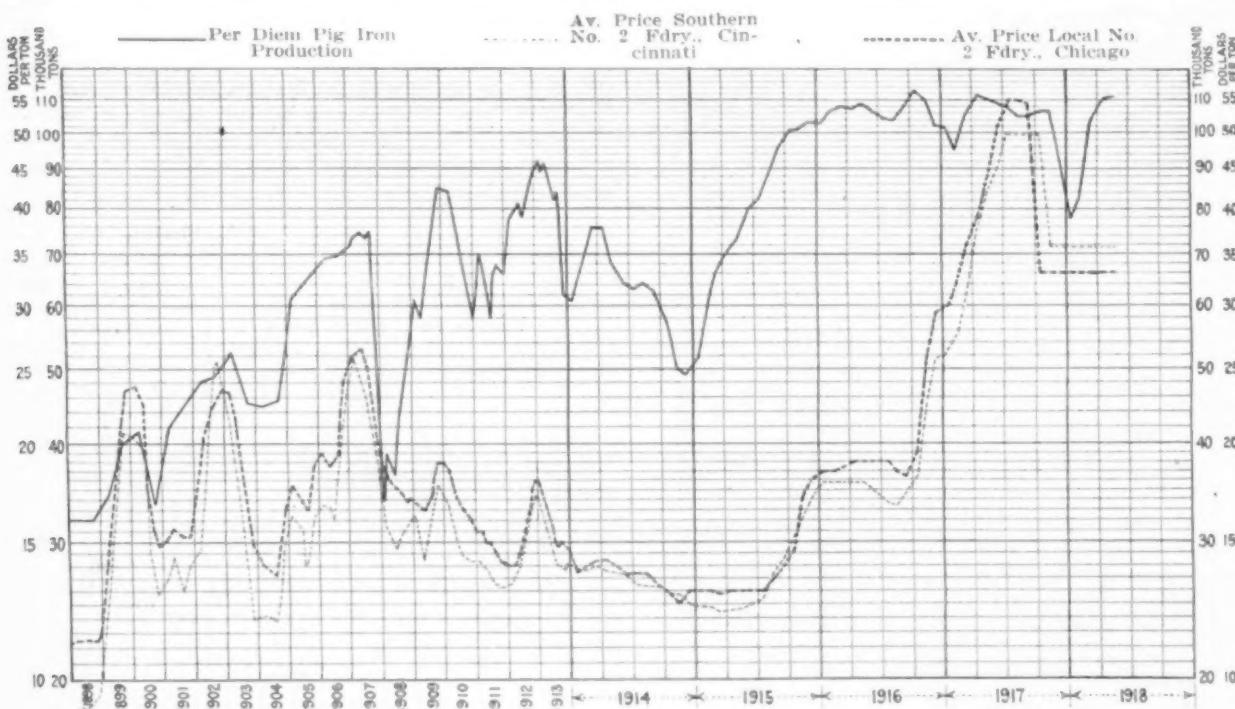


Diagram of Daily Average Production by Months of Coke and Anthracite Pig Iron in the United States Covering the Period from the Spanish American War to Date; Also of Monthly Average Prices of Southern No. 2 Foundry Iron at Cincinnati and Local No. 2 Foundry Iron at Chicago District Furnace. By the use of the ratio chart and proportionate scales for production and prices, parts of the one or all curves of the same slope represent changes at the same rate

Coke and Anthracite Furnaces in Blast						
Location of furnaces	Total number of stacks in blast	June 1		May 1		per day
		Number in blast	Capacity per day	Number in blast	Capacity per day	
<i>New York:</i>						
Buffalo	20	20	6,838	20	6,540	
Ferro	1	1	50	0	0	
Other, N. Y.	4	3	614	3	594	
New Jersey	4	4	756	4	719	
Ferro	1	1	30	1	32	
<i>Pennsylvania:</i>						
Lehigh Valley	21	14	4,024	12	3,500	
Spiegel	2	1	100	2	211	
Schuylkill Val.	12	10	2,856	10	2,924	
Ferro and Spiegel	1	1	78	1	45	
Lower Susquehanna	8	6	1,573	6	1,565	
Spiegel	2	2	89	2	104	
Lebanon Val.	8	4	600	4	586	
Ferro	3	3	200	3	158	
Pittsburgh Dist.	53	49	21,830	49	22,622	
Ferro and Spiegel	4	4	713	2	331	
Shenango Val.	19	17	5,740	19	5,680	
Western Pa.	25	21	6,300	23	6,645	
Spiegel	3	2	139	1	22	
Maryland	4	3	1,052	3	1,131	
Wheeling District	14	13	4,696	11	4,107	
<i>Ohio:</i>						
Mahoning Val.	26	25	10,407	25	10,273	
Central and Northern	26	24	9,397	23	9,467	
Southern	17	16	2,383	15	2,328	
Illinois and Ind.	41	37	17,472	38	17,658	
Ferro	1	1	57	1	64	
Mich., Wis. and Minn.	12	10	2,736	10	2,677	
Colo., Mo. & Wash.	7	5	1,193	5	1,258	
Ferro	1	1	117	1	100	
<i>The South:</i>						
Virginia	16	9	1,286	11	1,317	
Ferro	3	4	102	2	58	
Kentucky	7	5	648	5	632	
Alabama	36	31	7,022	31	6,996	
Ferro and Spiegel	1	1	92	0	0	
Tenn. and Ga.	16	11	1,100	11	1,116	
Total	419	359	112,290	354	111,460	

Diagram of Pig-Iron Production and Prices

The fluctuations in pig-iron production from 1898 to the present time are shown in the accompanying chart. The figures represented by the heavy line are those of daily average production by months of coke and anthracite iron. The two other curves on the chart represent monthly average prices of Southern No. 2 foundry pig iron at Cincinnati and of a local No. 2 foundry iron at furnace at Chicago. They are based on the weekly market quotations of THE IRON AGE.

The Record of Production

Production of Coke and Anthracite Pig Iron in the United States by Months Beginning Jan. 1, 1914—Gross Tons						
	1914	1915	1916	1917	1918	
Jan.	1,885,054	1,601,421	3,185,121	3,150,938	2,411,768	
Feb.	1,888,670	1,674,771	3,087,212	2,645,247	2,319,393	
Mar.	2,347,867	2,063,834	3,337,691	3,251,352	3,213,091	
Apr.	2,269,655	2,116,494	3,227,768	3,334,960	3,288,211	
May	2,092,686	2,263,470	3,361,073	3,417,340	3,446,412	
5 mos.	10,483,932	9,719,990	16,188,865	15,799,837	15,679,012	
June	1,917,783	2,380,827	3,211,588	3,270,055	.....
July	1,957,645	2,563,420	3,224,513	3,342,438	.....
Aug.	1,995,261	2,779,647	3,203,713	3,247,947	.....
Sept.	1,882,577	2,852,561	3,202,366	3,133,954	.....
Oct.	1,778,186	3,125,491	3,508,849	3,303,038	.....
Nov.	1,518,316	3,037,308	3,311,811	3,205,794	.....
Dec.	1,515,752	3,203,322	3,178,651	2,882,918	.....
Total, yr.*	23,049,752	29,662,566	39,039,356	38,185,981	.....

*These totals do not include charcoal pig iron. The 1917 production of this iron was 376,525 tons.

The figures for daily average production, beginning with January, 1911, are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1911—Gross Tons							
	1911	1912	1913	1914	1915	1916	1917
Jan.	56,752	66,384	90,172	60,808	51,659	102,746	101,643
Feb.	64,090	72,442	92,369	67,453	59,813	106,456	94,473
Mar.	70,036	77,591	89,147	75,738	66,575	107,667	104,882
Apr.	68,836	79,181	91,759	75,665	70,550	107,592	111,163
May	61,079	81,051	91,039	67,506	73,015	108,422	110,233
June	59,585	81,358	87,619	63,916	79,361	107,052	109,002
July	57,841	77,738	82,601	63,150	82,691	104,017	107,820
Aug.	62,150	81,046	82,057	64,363	89,666	103,346	104,772
Sept.	65,903	82,128	83,531	62,753	95,085	106,745	104,463
Oct.	67,811	86,722	82,133	57,361	100,822	113,189	106,550
Nov.	66,648	87,697	74,453	50,611	101,244	110,394	106,859
Dec.	65,912	89,766	63,987	48,896	103,333	102,537	92,997

The Philadelphia & Reading Coal & Iron Co., Pottsville, Pa., has advanced the wages of employees at its local shops 10 per cent, effective May 16. The advance will affect about 200 employees.

The Donner Union Coke Corporation Will Build Plant at Buffalo

Plans have been completed for the building of a large by-product coke-oven plant by the Donner Union Coke Corporation on a site of over 40 acres on the Buffalo River, Delaware, Lackawanna & Western, Buffalo, Rochester & Pittsburgh and South Buffalo railroads, near the present Donner Steel Co.'s plant. The project is being financed by the U. S. Government and its product during the period of the war will be used for war purposes. After the war the plant will be taken over and operated by the Donner Steel Co. and the Buffalo Union Furnace Co.

One of the principal by-products will be toluol for use in the manufacture of high explosives. Work on the ovens will be started without delay and it is expected the final unit will be completed within 14 months. Some of the units will be available before that time. It is estimated the ovens will use 2000 tons of coal per day. A large quantity of gas will be produced, which will be used by the Donner Steel Co.

The city council of Buffalo has granted permission for the closing of Beacon Street and adjoining streets to make the site available for the purposes of the plant.

Blast Furnace Notes

The Colonial furnace at Riddlesburg, Pa., which blew out May 5, has been fitted with a new hearth and flue jackets and relined. It will be blown in on foundry iron about June 10.

No. 5 Haselton furnace of the Republic Iron & Steel Co., at Youngstown, Ohio, which was first blown in in August, 1917, made a record production in May with a total of 16,901 tons, a daily average of 545 tons.

No. 3 blast furnace of the Republic Iron & Steel Co. at Haselton, Ohio, will be blown out during this month for relining and general repairs. Some new equipment will be added. At present the five blast furnaces of Republic company, at Haselton, Hall stack at Sharon, Pa., and Atlantic furnace at New Castle, Pa., are in blast.

Mattie blast furnace of A. M. Byers & Co., Inc., Girard, Ohio, blew out on May 29 for repairs, and to allow new equipment to be installed. Four 500-hp. Babcock & Wilcox boilers will be installed, the furnace and stoves will be relined, and a Brassert gas washer added. The stack has been making about 300 tons per day, and when the repairs and additions have been completed, it is expected to turn out 350 or more tons per day. The output is forge iron which is used in the puddling mills of the company at Girard. The stack is expected to be ready for blast again between Aug. 15 and Sept. 1.

On July 1 the blast furnace of the Sharpsville Furnace Co., at Sharpsville, Pa., which has been on Bessemer iron, will go on basic, the entire output of basic having been sold for nine months starting July 1 to an open hearth steel plant in the Youngstown district. This furnace made in May 6168 tons of Bessemer iron, the largest output in any one month in its history.

Large Imports of Manganese Ore in April

April imports of manganese ore were next to the largest of any month this year, the total having been 58,023 gross tons. This compared with 19,300 tons in March, 59,289 in February and 42,947 tons in January. The April, 1917, imports were 27,023 tons. The total for the 10 months ended April 30, 1918, was 489,754 tons, as compared with 512,041 tons for the same period ended April 30, 1917.

Culpepper Exum, president, has completed arrangements for the rebuilding of the Steel Cities Chemical Co.'s sulphuric acid plant at Fairfield. It will cost \$200,000. These works supply the Tennessee, Woodward, American Steel & Wire and other Birmingham district companies.

Iron and Steel Markets

STILL A STEEL SCARCITY

Government Needs Not Yet Fully Known

Pig Iron Production in May Exceeded in But One Other Month

Some days may yet elapse before a balance can be struck between the definitely scheduled demands the Government will make upon the steel industry in the remainder of the year and the country's newly ascertained capacity in the various finished forms required. The committee is still hard at work both in Washington and New York.

Meanwhile, new plans for larger war consumption of steel are coming out, the past week bringing further developments as to increased shipyard and fabricating capacity, the former taking in both coasts.

At the same time new reports are brought out of Government plans for laying hold of steel works. The industry continues skeptical as to all such news, but is in no mood to do business except at Government call.

The statement of the director of steel supply to the American Iron and Steel Institute that 16,800,000 tons in definite orders are on the books caused no surprise. Details are still lacking as to the time within which this amount can be actually used. But week by week steel makers are exerting themselves to the utmost to meet war demands, and still there is a scarcity, particularly in plates, with plate mill output greater than ever.

The demand for skilled labor for munition plants, shipyards, and other vital industries is rapidly increasing, but men are not in sight. Plans are on foot for systematically making heavy drafts through regional committees, upon workers whose ordinary employment is gone or will be because material is withheld.

Pig iron production in May was at a rate exceeded but once in the history of the industry. The total was 3,446,412 gross tons, or 111,175 tons a day, while that of April was 3,288,211 tons, or 109,607 tons a day. In October, 1916, the record month, the daily rate was 113,189 tons.

The May performance of the furnaces was not uniformly better than in April, the coke supply of some falling short. There is coming in also the factor of stoppages for relining. However, while 10 furnaces blew out last month, 15 blew in, making a total of 359 active on June 1 against 354 one month previous. But relining are likely to exceed resumptions in the summer months.

With charcoal iron estimated, the output of pig iron in May was at an annual rate of over 40,900,000 tons, compared with 38,647,000 tons in 1917, and the high record of 39,434,000 tons in 1916.

The May yield of ferromanganese and spiegel-eisen was surprising, the total of 54,633 tons comparing with an average of 33,000 tons in the first four months of the year. All the increase was needed and assurance for the second half of the year is given by the arrangement just made, by which vessels carrying coal for the Central Railway of Brazil will bring manganese ore on their return.

Two days of high heat in the past week were a reminder that lowered production may be expected as summer advances, sheet and tin plate mills being particularly affected.

Allocation of steel for the new cars and locomotives is now under way. Locomotive plate contracts amount to about 35,000 tons. The Railroad Administration has been urged to eliminate 68,000 tons of special 9-in. car channels for which new rolls would be required, adding further to the unconscionable delay in getting these cars.

The pig-iron canvass of blast furnaces and foundries is going on slowly. So many foundries have failed to respond that they have now been notified that those not heard from this week will be put in the list as engaged on non-Government work.

Lake Superior ore firms, with 33.6c. per gross ton added to their freight charge and with two wage advances of 10 per cent to miners since Jan. 1, are preparing to ask for an increase in the ore price, effective July 1. So far as pig iron and finished materials are concerned, prospects of advances at the readjustment this month have not been improved by recent developments at Washington.

The scrap trade is excited over the freight rate advances. Some contracts were drawn protecting dealers against higher freights, but in many cases scrap producers will suffer from a decision that no price may be paid at the point of origin which will make the cost of old material at destination exceed the Government maximum figure.

At 8,792,231 tons, the shipments of Lake Superior ore in May made a new record.

Pittsburgh

PITTSBURGH, June 4—(By Wire).

Local conditions in the steel trade show no important change, the efforts of manufacturers still being directed to turning out as large an output as possible, giving 100 per cent of it to the Government, and also in making plans to materially increase output in order to better meet the fast growing demands of the Government for steel. The huge shipbuilding program as laid out by the Emergency Fleet Corporation means that many thousands of tons of shapes will be needed for these boats, and already the structural mills are filled up with Government orders for several months. To meet the heavier demand for shapes that is coming, more capacity will be needed, and it is stated that the McClintic-Marshall Co. of this city will build two very large fabricating plants, but definite plans have not yet been worked out and nothing can be said about them as yet. Some new capacity in plates will be in the market in the summer, the Youngstown Sheet & Tube Co. and the Brier Hill Steel Co. at Youngstown, both having very large plate mills under way which are expected to be producing plates not later than October. It is a possibility that some additions to plate capacity may also be ordered. According to J. L. Replogle, director of steel supply, unfilled orders for steel now on the books of the mills total over 16,000,000 tons, and fully as much more will be placed before the year ends. The needs of steel for our own Government and for the Allies are bound to increase very fast as the war building program advances. The outlook now is that there will be very little steel available for commercial uses before late in the year, if then.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	June 4 1918	May 28 1918	May 7 1918	June 6 1917
No. 2 X, Philadelphia...	\$34.25	\$34.25	\$34.25	\$45.50
No. 2, Valley furnace...	33.00	33.00	33.00	45.00
No. 2 Southern, Cincinnati...	35.90	35.90	35.90	42.90
No. 2, Birmingham, Ala...	33.00	33.00	33.00	40.00
No. 2, furnace, Chicago*...	33.00	33.00	33.00	47.00
Basic, deliv., eastern Pa...	32.75	32.75	32.75	42.50
Basic, Valley furnace...	32.00	32.00	32.00	45.00
Bessemer, Pittsburgh...	36.15	36.15	36.15	50.95
Malleable, Chicago*...	33.50	33.50	33.50	47.00
Malleable, Valley...	33.50	33.50	33.50	46.00
Gray forge, Pittsburgh...	32.75	32.75	32.75	43.95
L. S. charcoal, Chicago...	37.50	37.50	37.50	50.00

Rails, Billets, etc., Per Gross Ton:	June 4 1918	May 28 1918	May 7 1918	June 6 1917
Bess. rails, heavy, at mill...	55.00	55.00	55.00	38.00
O.-h. rails, heavy, at mill...	57.00	57.00	57.00	40.00
Bess. billets, Pittsburgh...	47.50	47.50	47.50	95.00
O.-h. billets, Pittsburgh...	47.50	47.50	47.50	95.00
O.-h. sheet bars, P'gh...	51.00	51.00	51.00	100.00
Forging billets, base, P'gh...	60.00	60.00	60.00	115.00
O.-h. billets, Philadelphia...	50.50	50.50	50.50	95.00
Wire rods, Pittsburgh...	57.00	57.00	57.00	90.00

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia...	3.685	3.685	3.685	4.659
Iron bars, Pittsburgh...	3.50	3.50	3.50	4.25
Iron bars, Chicago...	3.50	3.50	3.50	4.00
Steel bars, Pittsburgh...	2.90	2.90	2.90	4.25
Steel bars, New York...	3.095	3.095	3.095	3.29
Tank plates, Pittsburgh...	3.25	3.25	3.25	7.00
Tank plates, New York...	3.445	3.445	3.445	8.169
Beams, etc., Pittsburgh...	3.00	3.00	3.00	4.00
Beams, etc., New York...	3.195	3.195	3.195	4.419
Skelp, grooved steel, P'gh...	2.90	2.90	2.90	4.00
Skelp, sheared steel, P'gh...	3.25	3.25	3.25	6.00
Steel hoops, Pittsburgh...	3.50	3.50	3.50	4.75

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

There is still a good deal of complaint from manufacturers over present ruling prices on certain finished steel products, but the opinion is freely expressed that the War Industries Board will not make any advances in prices for third quarter delivery, with the possible exception of tin plate and rivets. The tremendous advance in price of pig iron gives the mills a good argument for higher prices on tin plate for second half of the year delivery, while the rivet makers claim that present prices to some makers in the East are below actual cost. Stocks of iron and steel products are steadily being depleted, and jobbers are receiving very few shipments from the mills to replenish them. On some lines of finished steel products, notably sheets, it is claimed that jobbers in certain sections are not strictly observing Government maximum prices, but are selling at higher figures.

Pig Iron.—The survey being made of the pig iron industry has not been completed for the reason that some consumers of pig iron have failed to fill out the questionnaire and return it to the Committee on Pig Iron, Iron Ore and Lake Transportation, of which H. G. Dalton, Cleveland, is chairman. Some furnaces have also failed to fill out and return their questionnaire, and it has been suggested that if this is not done by June 6 all consumers of pig iron failing to report by that date will be considered as operating on other than Government or essential work, and the furnaces are asked to make their report to the Government and to the committee at Cleveland on such basis. One leading furnace interest finds that nearly 11,000 tons of Bessemer iron and about 25,000 tons of basic iron are under contract to concerns not working on strictly war essentials, and this iron will likely be allocated to other melters that are making strictly war products. This is a matter that will be handled by the Sub-Committee on Pig Iron, Iron Ore and Lake Transportation, and by the director of steel supply as soon as the survey of the pig iron situation has been completed. Pig iron producers now take the position that their output

Sheets, Nails and Wire,	June 4 1918	May 28 1918	May 7 1918	June 6 1917
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh...	5.00	5.00	5.00	7.50
Sheets, galv., No. 28, P'gh...	6.25	6.25	6.25	9.00
Wire nails, Pittsburgh...	3.50	3.50	3.50	3.50
Cut nails, Pittsburgh...	4.00	4.00	4.00	4.00
Fence wire, base, P'gh...	3.25	3.25	3.25	3.45
Barb wire, galv., P'gh...	4.35	4.35	4.35	4.35

Old Material, Per Gross Ton:

Carwheels, Chicago...	\$29.00	\$29.00	\$29.00	\$34.00
Carwheels, Philadelphia...	29.00	29.00	29.00	31.00
Heavy steel scrap, P'gh...	28.50	28.50	28.50	35.90
Heavy steel scrap, Phila...	29.00	29.00	29.00	28.00
Heavy steel scrap, Ch'go...	29.00	29.00	29.00	33.00
No. 1 cast, Pittsburgh...	28.50	28.50	28.50	30.00
No. 1 cast, Philadelphia...	29.00	29.00	29.00	31.00
No. 1 cast, Ch'go, net ton...	27.00		26.50	27.00
No. 1 RR. wrot, Phila...	34.00	34.00	34.00	44.00
No. 1 RR. wrot, Ch'go, net...	29.75	29.75	29.75	37.00

Coke, Connellsville, Pet Net Ton at Oven:

Furnace coke, prompt...	\$6.00	\$6.00	\$6.00	\$10.00
Furnace coke, future...	6.00	6.00	6.00	9.00
Foundry coke, prompt...	7.00	7.00	7.00	10.50
Foundry coke, future...	7.00	7.00	7.00	10.00

Metals:

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lead copper, New York...	23.50	23.50	23.50	32.50
Electrolytic copper, N. Y...	23.50	23.50	23.50	32.50
Spelter, St. Louis...	7.25	7.25	6.62 1/2	9.50
Spelter, New York...	7.50	7.50	7.12 1/2	9.75
Lead, St. Louis...	6.92 1/2	6.85	6.42 1/2	11.50
Lead, New York...	7.05	7.05	6.62 1/2	11.50
Tin, New York...	90.00	\$1.00	\$1.00	60.25
Tin plate, 100-lb. box, P'gh...	\$7.75	\$7.75	\$7.75	\$8.50

of pig iron is in the hands of the director of steel supply, and that it will be shipped to consumers under orders from that source. There is an insistent demand for pig iron from nearly all consumers, but no iron is available in the open market. The freight rate on pig iron from the Mahoning Valley to the Pittsburgh and Cleveland districts has been increased from 95c. to \$1.10 per gross ton, and a further increase of 25 to 30 per cent or probably 30c. per gross ton or more will go into effect on June 25, when the new freight rates go into operation. Prices in effect until June 30 are as follows:

Basic pig iron, \$32; Bessemer, \$35.20; gray forge, \$32; No. 2 foundry, \$33; No. 3 foundry, \$32.50, and malleable, \$33.50, all per gross ton at Valley furnace, the freight rate for delivery in the Cleveland and Pittsburgh districts being \$1.10 per ton.

Billets and Sheet Bars.—No semi-finished steel in the forms of billets or sheet bars can be obtained in the open market, and it is also almost impossible to get any discard steel, the mills having contracts for shell steel using this themselves. All the mills are running short of steel, and would be very glad to buy in the open market if it could be had. The shortage in supply of sheet bars is steadily getting worse, and is cutting down output of sheets and tin plate very considerably. It is not believed any change in prices on semi-finished steel will be made by the War Industries Board for third quarter delivery.

We quote 4 x 4 in. soft Bessemer and open-hearth billets at \$47.50, sheet bars \$51, forging ingots \$73, and forging billets \$60 base, all f.o.b. at mill, Pittsburgh or Youngstown.

Ferroalloys.—The local market on ferroalloys has quieted down to some extent, and it is believed that consumers are pretty well covered over the remainder of this year. One sale of 500 tons of 70 per cent domestic ferromanganese was reported at \$250 delivered for last half of the year delivery. Another consumer is said to have bought about 1000 tons of 16 per cent spiegeleisen at about \$65 at maker's furnace. We con-

tinue to quote 70 per cent ferromanganese at \$250 delivered, 16 per cent spiegeleisen at \$65 to \$70 at furnace and 50 per cent ferrosilicon for prompt shipment at \$160 and for delivery over the last half of the year, \$150 to \$155 at furnace, the furnaces usually absorbing the freight.

We now quote 9 per cent Bessemer ferrosilicon at \$54; 10 per cent, \$55; 11 per cent, \$58.30; 12 per cent, \$61.60. We quote 6 per cent silvery iron, \$41; 7 per cent, \$43; 8 per cent, \$45.50; 9 per cent, \$47.50; 10 per cent, \$50. Three dollars per gross ton advance for each 1 per cent silicon for 11 per cent and over. All the above prices are f.o.b. maker's furnace, Jackson or New Straitsville, Ohio, these furnaces having a uniform freight rate of \$2 per gross ton, for delivery in the Pittsburgh district.

Steel Rails.—Some fair-sized lots of light rails are being placed for future delivery, but practically nothing is being done in standard sections. As yet nothing has been heard from the Government as to when it will place its expected orders for standard rails. The Government price on 25 to 45-lb. sections up to June 30 is \$3 per 100 lb., f.o.b. Pittsburgh. Prices on standard sections are open, and on Bessemer rails from \$60 to \$62 and on open hearth \$63 to \$65 at mill.

Cotton Ties.—As yet none of the mills rolling cotton ties this year has sold any material for delivery starting July, but consumers were advised some time ago that their needs will be taken care of, and at whatever prices may be fixed by the Government when the War Industries Board meets late this month to consider prices on iron and steel products for third quarter. The output of cotton ties this year will be fully as large as last year, and perhaps heavier, in spite of the shortage in supply of steel. The trade here believes that present prices on cotton ties as fixed when the session opened, and which for July carry an advance of 3c. per bundle over the April price, which was \$1.90 per bundle of 100 lb. for lots of 3000 bundles or over, will be reaffirmed.

We quote cotton ties at \$1.90 per bundle of 45 lb. for lots of 3000 bundles and over. For lots of 1000 bundles and up to, but not including, 3000 bundles, \$1.92 per bundle, f.o.b. Pittsburgh. These prices are for April shipment, while for May 1c. additional carrying charge is made, and 2c. for June.

Wire Rods.—Owing to the growing scarcity in supply of steel, a local maker of rods which has two double mills will operate only one during the entire month of June. The demand for rods is active, but local mills are not accepting orders unless the buyer can show the material is needed for Government use and can furnish priority A order. The demand for high carbon rods is active, and local makers say they could sell freely if they could spare the steel to roll these rods. There is some foreign inquiry, but local mills are not quoting on this as it is not likely Government licenses for foreign shipments would be granted. Prices on rods in effect until June 30, are given on page 1507.

Wire Products.—The order for 50,000 tons of barb wire for the British Government was allocated last week. One local mill took 4000 tons, another about 4500 tons, and the leading interest a much larger quantity. In addition to this, about 5,000 tons of barb wire wanted on the original order for France, but which was canceled by the Government very shortly after it was placed, has been given out, and allocated to the mills. It is said the other 45,000 tons of this contract may come along later. The American Car & Foundry Co., which has large orders for cars from the Government, has an inquiry in the market for 4,500 kegs of wire nails for the cars it will build. In fact, about 18,000 kegs of wire nails will be needed for these cars, and not 28,000 kegs as stated by several sources. Of the 40,000 kegs of wire nails allocated some time ago for the Bureau of Supplies and Accounts, Navy Department, it is said most will be shipped to France. The commercial demand for nails is very heavy, and local mills are turning down orders from the largest jobbers in the country, stating they are conserving their entire output for the Government. Stocks of nails are very low. Four or five of the largest jobbers report that on the sizes more commonly used their stocks are about depleted. The Government price on cut nails is \$4.00 per keg, f.o.b. Pittsburgh. Prices on wire nails and wire, up to June 30, are given on page 1507.

Hot-Rolled Strip Steel.—The Government continues to take probably 75 per cent of the present output of hot-rolled strip steel on direct and indirect orders. The output of the mills is said to be running about 60 per cent of normal capacity owing to the shortage in supply of steel. The Government price for hot-rolled strip steel for this quarter is \$3.50 per 100 lb. f.o.b. Pittsburgh. The list of extras and differentials was given on pages 1357 and 1374 of THE IRON AGE of May 23.

Cold-Rolled Strip Steel.—Probably 75 per cent or more of the output of cold-rolled strip steel is going to the Government on direct and indirect orders, but there is still a fair part of the output available for commercial users. The output of cold-rolled strip steel is running from 60 to 75 per cent of capacity, there still being a shortage in supply of steel and also in labor to some extent. It is understood most makers are not accepting orders from the general trade, except when accompanied by priority A certificate. We quote cold-rolled strip steel at \$6.50 per 100 lb. f.o.b. Pittsburgh, terms 30 days, less 20 per cent for cash in 10 days, when sold in quantities of 300 lb. or more, freight allowed to destination when it does not exceed 31c. per 100 lb.

Shafting.—Makers state the Government is still taking 90 per cent or more of the present limited output of shafting on direct and indirect orders. The implement trade and also other consumers of shafting making strictly war essentials are receiving shipments promptly, but jobbers who send in orders must show priority A certificates before the mills will fill them. Discounts fixed by the Government are very firm, and are 17 per cent off in carloads, and 12 per cent in less than carloads, f.o.b. Pittsburgh.

Nuts and Bolts.—Practically all of the orders for 129,000,000 bolts recently placed by the Government have been sent to the makers, and it is stated deliveries on this order are to run over the remainder of this year. An inquiry is out from the Ordnance Department for about 40,000,000 bolts and very large other orders are expected in a short time. The demand from the commercial trade is heavy, but no orders are filled unless accompanied by Government priority certificates. The output of nuts and bolts is still being restricted by the scarcity in supply of steel. Government discounts in effect until June 30, are given on page 1507.

Rivets.—It is probable a committee representing makers of rivets will soon hold a conference with the War Industries Board at Washington, in an endeavor to have prices of rivets advanced. Some makers claim they can not possibly make rivets at present prices of steel and realize a profit. Nearly the entire output is being taken by the Government on direct and indirect orders, and the demand from the commercial trade is active. We quote cone-head structural rivets at \$4.40, cone-head boiler rivets at \$4.50 per 100 lb. and small rivets at 50 and 10 per cent off of list.

Hoops and Bands.—Makers report that practically their entire output of hoops and bands is going to the Government on direct and indirect orders. The demand for hoops for cooperage purposes is extremely heavy. We quote steel hoops for cooperage purposes \$3.50 and steel bands at \$3.50 per 100 lb. f.o.b. Pittsburgh, extras and differentials in effect being those given on pages 1357 and 1374 of THE IRON AGE of May 23. The price of bands is the same as steel hoops and carries the same extras and classification, instead of the steel bar extras as before.

Skelp.—Mills rolling skelp are sold up for the remainder of this year, and this material can not be had on new orders.

We quote grooved skelp at \$2.90; universal skelp, \$3.15, and sheared skelp, \$3.25 base. Special skelp for boiler tubes, etc., is \$3.40 for base sizes and \$3.55 for other sizes, all prices being per 100 lb., f.o.b. Pittsburgh.

Structural Material.—It is probable the McClintic-Marshall Co. will erect two large fabricating plants in Pennsylvania in order to take care of the heavy demand from the Government for fabricated steel, but no definite plans have yet been made. The John Eich-

leay, Jr., Co., Pittsburgh, has taken 2500 tons for the new car shop buildings for the Baltimore & Ohio Railroad in this city, and the Pittsburgh Bridge & Iron Works, 250 tons for a new steel building to be erected by the National Aniline & Chemical Co. at Buffalo. On June 10 bids are to be opened for new steel buildings for the Pennsylvania Lines West at Columbus, Ohio. These include storeroom and machine shop, 1500 tons; engine house, 300 tons, and craneway and shed over tire pit, 180 tons. The McClintic-Marshall Co. and the American Bridge Co. are confining themselves entirely to Government work. We quote beams and channels up to 15 in. at 3c. at Pittsburgh.

Plates.—The Government is taking 100 per cent of the output of plates, and from all indications will continue to do so for some months. As the Government shipyards are increasing their output, and the private yards also as well, the demand for plates is bound to show an enormous increase and is certain to take the entire output of the mills for some time. The new plate mills being built by the Youngstown Sheet & Tube Co. and the Brier Hill Steel Co. at Youngstown, Ohio, will be factors in the plate market by October or before. It is understood that plates, shapes and bars for the Government cars have practically all been allocated to the mills. We quote $\frac{1}{4}$ -in. and heavier sheared plates at 3.25c., Pittsburgh.

Iron and Steel Bars.—The Government is taking very close to 100 per cent of the output of steel bars, but is not taking as large a percentage of the output of iron bars, and mills report they have some tonnage available for commercial consumers for fairly prompt delivery. We quote steel bars rolled from steel billets at 2.90c., from old steel rails, 3c., and refined iron bars, 3.50c. at mill, Pittsburgh.

Sheets.—The output of sheets is being still further restricted by the shortage in supply of sheet bars, and the rate of operation among the independent mills in the last half of May was not as large as in the first half for this reason. The Government is still placing fairly heavy orders for blue annealed, black and corrugated sheets, and some very heavy business is in sight. Jobbers' stocks are badly depleted, and they are able to obtain shipments from the mills only when they furnish priority certificates with their orders. The output of sheets by the mills is fully under contract over the next four or five months, mostly on Government direct and indirect orders. Prices on sheets in effect until June 30 are given on page 1507.

Tin Plate.—In spite of scarcity in steel and labor, the tin plate mills are still able to maintain an average rate of output of about 95 per cent, nearly all of which is going to the manufacturers of food containers. The tin plate makers strongly feel there should be an advance in prices of tin plate for second half of the year delivery. The general opinion is, however, that the present price will be reaffirmed. Output over the next two or three months is likely to show a falling off on account of hot weather. Earnings of tin mill workers are so large that they feel they can afford to be idle one or two days a week and still earn very large wages. We quote tin plate at \$7.75 per base box, up to June 30, rolled from Bessemer or open-hearth steel f.o.b. Pittsburgh. The demand for terne plate is very light, and the mills are not strongly pushing its manufacture. Prices of terne plate are given on page 1507.

Spikes.—Some fairly large inquiries for spikes have come out in the past week. From the Pennsylvania Lines West is an inquiry for 9000 kegs for delivery July to October. The Norfolk & Western asks for 8000 kegs for delivery over the remainder of the year, and the Nickel Plate for 1700 kegs. We quote:

Standard sizes of railroad spikes $9/16 \times 4\frac{1}{2}$ in. and larger, \$3.90 per 100 lb. in lots of 200 kegs of 200 lb. each, or in larger lots. Boat spikes, \$5.25 per 100 lb., track bolts, \$4.90 basei n lots of 200 kegs or more; less than 200 keg lots, \$1 per 100 lb. extra. All f.o.b. Pittsburgh.

Wrought Pipe.—Weekly reports are being sent in by the makers of iron and steel pipe to the Government at Washington, showing shipments of pipe during the previous week, consignees and the purposes for which

the pipe is to be used. A careful survey of the situation shows that fully 90 per cent of the present output of iron and steel pipe is for Government use, either on direct or indirect orders. Commercial demand is fairly heavy, but priority certificates must be sent with the orders before the mills will fill them. The pipe mills are practically filled for the remainder of this year. The Government is still a very heavy user of 8 and 10-in. pipe on various oil-carrying projects under way at different places. Discounts on iron and steel pipe are given on page 1507.

Boiler Tubes.—The demands of the Government for seamless steel tubing are so heavy and are increasing so rapidly that it is not unlikely several of the leading makers of seamless tubes may before long start the erection of new plants under Government direction in order to meet the steadily increasing demand for seamless steel tubes, which the mills are unable to supply. Very heavy Government orders lately have been taken for boiler tubes and mills are sold up for many months. Discounts on iron and steel tubes, in effect until June 30, are given on page 1507.

Coke.—The supply of cars now seems to be about normal, and there is no further complaint from blast furnaces over the failure to receive coke; in fact some furnaces report they have been able to accumulate some stock. The supply of cars is really larger than is needed to take care of the present output of coke, which is running 25 per cent or more under normal. Ordinarily the Upper and Lower Connellsville regions can turn out from 425,000 to 450,000 tons per week, but it is seldom the output reaches 350,000 tons. The present rate on coke from the Connellsville regions to Youngstown, Ohio, is \$1.35 per net ton, and this is expected to be increased to \$1.75 per net ton on June 25, when the new freight rates go into effect. Most furnaces require more than a ton of coke to make a ton of iron, so that the increased cost in making pig iron in the coke item alone will be close to 50c. per ton, all coke being sold in net tons at oven, consumers paying the freight. No contracts are being made for coke, and it is not expected there will be any change in prices for the third quarter. The output of coke in the Upper and Lower Connellsville regions for the week ending May 25 was 340,100 tons, a decrease below the previous week of 2,270 tons. Government prices in effect until June 30, are \$6 for 48-hr. furnace coke, \$7 for 72-hr. foundry coke, and \$7.35 for crushed coke from 1-in. size, all in net tons at oven.

Old Material.—The monthly scrap list of the Pennsylvania Railroad closed on June 4, and awards are to be made on June 7. It is expected a good deal of the 10,000 tons of scrap in the list will be sold direct to consumers, as has been the case for some months. Dealers report a little more material is moving to consumers, and that much more could readily be sold if the scrap could be had. All consumers are badly in need of scrap, and would buy freely if dealers had it to offer. At the same time, a good many steel plants are running on Government shell steel contracts, and the discard in the ingots is 25 to 30 per cent or more, all of the discard steel being remelted in the open hearths, saving these concerns from buying a good deal of heavy melting steel in the open market. It is difficult to bring scrap from other places to this district, the freights being against it. Dealers report that when they are able to get scrap and sell it, they have very little trouble in getting cars, and the local situation as regards supply of cars is again about normal. Reports are still current that scrap is being sold at higher than the Government maximum prices, but these cannot be confirmed. We note sales of about 2000 tons of low phosphorus scrap at \$39 delivered, about 3000 tons of select heavy steel melting scrap at \$29 delivered, and about 800 tons of turnings at \$19 delivered, the buyers in all cases paying the dealers who furnish this scrap the commission of $3\frac{1}{2}$ per cent. Dealers believe that just as soon as the Government starts to wreck cars and locomotives, which it is expected to do before long, the supply of scrap will be much better. Prices on iron and steel scrap, effective from April 1, nearly all of which have been fixed by the Government, in effect for

this quarter, for delivery in Pittsburgh and other points that take Pittsburgh freights, are as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh, delivered	\$28.50 to \$29.00
No. 1 cast scrap (for steel plants)...	28.50 to 29.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., Franklin, Pa., and Pittsburgh....	33.00 to 34.00
Hydraulic compressed steel scrap....	26.00 to 27.00
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	24.00 to 25.00
Bundled sheet stamping scrap....	22.00 to 23.00
No. 1 railroad malleable scrap....	28.00 to 29.00
Railroad grate bars....	18.00 to 19.00
Low phosphorus melting stock (un-guaranteed)....	34.00
Low phosphorus melting stock (guaranteed)....	36.50
Low phosphorus melting stock (bloom and billet ends, heavy plates)....	39.00
Iron car axles....	46.00 to 46.50
Locomotive axles, steel....	46.00 to 46.50
Steel car axles....	46.00 to 46.50
No. 1 busheling scrap....	26.00 to 27.00
Machine shop turnings....	18.00 to 19.00
Cast iron wheels....	28.00 to 29.00
Rolled steel wheels....	34.00 to 36.00
Sheet bar crop ends (at origin)....	34.00 to 35.00
Cast iron borings....	18.50 to 19.00
No. 1 railroad wrought scrap....	33.00 to 34.00
Heavy steel axle turnings....	23.00 to 24.00
Heavy breakable cast scrap....	28.00 to 29.00

The Hungarian State Railways intend to establish a new locomotive factory. They already possess one at Budapest, says the *Neue Freie Presse*, capable of turning out some 300 locomotives per year. As the Hungarian State owns suitable iron works, a large new plant would add considerably to its output and its power to compete in exporting, especially to the Balkans. The question has also been raised whether the Austrian State should not undertake the manufacture of rolling stock. The Austrian locomotive factories produced over 400 locomotives per year in time of peace, 366 in 1916, and 328 in 1917. The Skoda Works intend to establish a locomotive plant.

A process for making iron sponge is patented by Alf Sinding-Larsen (U. S. 1,256,939—Feb. 19, 1918) in which iron ore is the raw material used. The dry reduction process is used, which consists in causing powdered raw material to be acted upon by "a gaseous reducing agent in the upper heated zone of a reaction chamber, causing simultaneously a condensation or absorption of the products of the reaction, such as water in the lower zone and introducing a gaseous reducing agent into the reaction chamber in a direction counter to the flow of the hot reaction vapors."

The International Railway Co., Buffalo, will open on Sunday next, June 9, its new fast express through trolley line between Buffalo and Niagara Falls, which has just been completed at a cost of \$2,000,000. The running time between the city limits of the two cities will be less than 25 minutes, or 55 minutes between the central terminals in each of the cities. The line is constructed over private right of way outside of the cities, to relieve the heavy traffic on the old route, which will be continued on a 90-minute schedule.

Recently at Youngstown, Ohio, a drive was made for a war chest of \$1,000,000 and which was over subscribed. Leading steel companies subscribed to this war chest fund as follows: Youngstown Sheet & Tube Co., \$150,000; Republic Iron & Steel Co., \$85,000; Brier Hill Steel Co., \$60,000, and Carnegie Steel Co., \$25,000. J. A. Campbell, president of the Youngstown Sheet & Tube Co., was chairman of the executive committee, which will also be in charge of the distribution of the money collected.

At the Hasletton and Lowellville, Ohio, plants of the Sharon Steel Hoop Co., Sharon, Pa., there are 2219 employees, and they subscribed a total of \$57,352 for the Red Cross fund. This is an average of \$25.84 for each employee. The Sharon Steel Hoop Co. subscribed \$20,000 to the Red Cross fund.

Chicago

CHICAGO, June 4 (By Wire).

The placing of Government freight car material has begun, but action drags for some unknown reason. The American Car & Foundry Co. has entered with the leading local interest 87,000 tons of plates, shapes and bars. How this material can be supplied without disturbing ship material is a matter of conjecture. The bar iron mills are anxiously awaiting an allotment of tonnage for car work. They have capacity waiting and point out that the use of iron will conserve steel. It is estimated that the 100,000 Government freight cars will require about 1,300,000 tons of material, roughly divided as follows: Plates, 50 per cent; shapes, 37½ per cent, and bars, 12½ per cent.

Meanwhile mills which can roll shell steel are awaiting fresh orders for that product. Steel of any kind can not be had except where orders are accompanied by priority certificates, this policy also being followed by jobbers. It is figured that fully 100 per cent of the plate capacity is required by the Government, light plates being also required for tanks, smoke stacks, masts, superstructure work on vessels, truck bodies, depth bombs, etc. Straggling reports from consumers delay the completion of the pig iron survey and meanwhile little iron is being sold.

Pig Iron.—Some of the consumers of pig iron are slow in forwarding to producers the statistical data which must be furnished to the Sub-Committee on Pig Iron, Ore and Lake Transportation of the American Iron and Steel Institute. Some of them have been hurried up by the statement that if they did not report it could only be assumed that they were engaged in making non-essentials. Giving the desired information improperly also has caused trouble for producing interests. Small tonnages, principally Southern iron, have been placed in the week, following the announcement by the sellers that they had a little iron to place. The Government is becoming active in seeing that the makers of war munitions get all the raw material they need. In pig iron, this has been manifested by inquiries received from the local shipping board asking what had been done or would be done about certain shipments of whose backwardness complaint had been made. In all of these cases the sellers have been able to supply car numbers, and it is up to the Government through the railroads to do the rest. It is easy to dispose of any metal unless it is too high in sulphur. A Northern producer is booking orders from its customers subject to its ability to ship and taking care to emphasize that the Government may intervene and direct shipping.

The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic irons, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5....	\$37.50
Lake Superior charcoal, No. 6 and Scotch....	39.00 to 40.50
Lake Superior charcoal, No. 6 and Scotch....	40.00
Northern coke foundry, No. 1....	33.50
Northern coke foundry, No. 2....	33.00
Northern coke foundry, No. 3....	32.50
Northern high-phosphorus foundry....	33.00
Southern coke No. 1 foundry and No. 1 soft....	38.50
Southern coke, No. 2 foundry....	37.00
Malleable....	33.50
Basic....	32.00
Low phosphorus (copper free)....	53.00
Silvery, 7 per cent....	45.54

Ferroalloys.—One interest handling ferromanganese is discouraging sales for delivery this year in view of it being heavily booked ahead. Another interest, however, finds no takers for 80 per cent ferromanganese at \$285. Seventy per cent, the standard, is quoted at \$250 delivered. Four dollars is to be added for each additional unit over 70. Spiegeleisen is quoted at \$70, furnace, for 16 to 18 per cent, and a sale of 500 tons was made on Saturday last.

Plates.—It is pretty safe to assert that the Government can use fully 100 per cent of the plate production, aside from the material required for ships, cars, boilers, etc. Light plates are in great demand for the

construction of smoke stacks, masts, tanks, truck bodies and a multitude of other requirements. A part of the freight car tonnage has been placed, but the majority of it is pending. The official mill quotation is 3.25c., Pittsburgh or Chicago, and jobbers quote 4.45c. The latter must be satisfied as to the need of material for essential work.

Structural Shapes.—The Northwestern Bridge & Iron Co. will fabricate 450 tons required for a girder shop for the Pawling & Harnischfeger Co., Milwaukee, Wis., and an unknown bidder will supply 158 tons to erect a tipple for the Valier Coal Co., Valier, Ill. Essential needs only are recognized. The mill quotation is 3c., Chicago or Pittsburgh, and the jobbers quote 4.25c. for material from warehouse.

Bars.—The bar-iron mills are anxiously awaiting an allotment of tonnage to be used in building the Government freight cars. It is argued by them that all available facilities should be used and that the substitution of iron for steel will lessen the burden on the steel mills to an extent worthy of consideration. Official attention has been called to the situation in various ways. With mild steel only orders backed by priority certificates are of avail. The demand for rail carbon bars is light. We quote:

Jobbers' prices: Soft steel bars, 4.10c.; bar iron, 4.10c.; reinforcing bars, 4.10c.; base, with 5c. extra for twisting sizes $\frac{1}{2}$ in. and over and usual card extras for smaller sizes; shafting, list plus 10 per cent.

Mill prices are: Iron bars, 3.50c., Chicago; rail carbon, 3c., Chicago; mild steel bars, 2.90c., Chicago or Pittsburgh.

Sheets.—To sheets apply the same restrictions that exist with other products. At least some of the mills are not overloaded with business; others which must go outside for sheet bars cannot get enough to run full. A maker of feed troughs for farm animals applied for galvanized sheets, stating that he was manufacturing an essential. It was suggested to him that the troughs could be made of wood or concrete. We quote No. 28 black sheets at 5c.; No. 28 galvanized at 6.25c., and No. 10 blue annealed at 4.25c., all Pittsburgh.

We quote for Chicago delivery out of stock, regardless of quantity, as follows: No. 10 blue annealed, 5.45c.; No. 28 black, 6.45c., and No. 28 galvanized, 7.70c.

Wire Products.—The situation presents no change. For some products orders are being taken to be filled at mill convenience. The leading interest is selling no barbed wire. While production is going ahead at a good rate it would be better were more steel obtainable. We quote:

Nails, \$3.50, Pittsburgh; plain fence wire, \$3.25; painted barb wire, \$3.65; galvanized barb wire, \$4.35; polished staples, \$3.65, and galvanized staples, \$4.35.

Cast Iron Pipe.—No lettings or new propositions are announced. The shops have a fair amount of general work in hand, but are not busy.

Quotations per net ton Chicago are as follows: Water pipe, 4-in., \$63.35; 6-in. and larger, \$60.35, with \$1 extra for Class A water pipe and gas pipe.

Bolts and Nuts.—Orders are more numerous, the jobbers and consumers having come to a realization that the near future may bring a pronounced curtailment of production for domestic purposes. For prices and freight rates see finished iron and steel, f.o.b. Pittsburgh, page 1507. Jobbers quote:

Structural rivets, 5.50c.; boiler rivets, 5.60c.; machine bolts up to $\frac{1}{2}$ x 4 in., 40 and 10 per cent off; larger sizes, 35 and 5 off; carriage bolts up to $\frac{1}{2}$ x 6 in., 40 and $2\frac{1}{2}$ off; larger sizes, 30 and 5 off; hot pressed nuts, square tapped, \$1.05 off, and hexagon tapped, 85c. off per 100 lb.; coach or lag screws, gimlet points, square heads, 50 per cent off.

Rails and Track Supplies.—The market is inactive. We quote:

Standard railroad spikes, 4.11 $\frac{1}{2}$ c., Chicago. Track bolts, with square nuts, 5.11 $\frac{1}{2}$ c., Chicago. Tie plates, steel, 3.25c.; tie plates, iron, 3.75c.; f.o.b. maker's mill. The base for light rails is 3c., f.o.b. maker's mill for 25 to 45-lb. sections, lighter sections taking Government extras.

Old Material.—An agitation is in progress to permit the shipment of scrap from one territory to another, provided there is a surplus of material in one, the purchaser to pay the freight difference, and it is believed the necessary permission will be granted, if an acute shortage occurs. In parts of the East, it appears there is not enough material, one large inquiry for low phosphorus scrap required for Government work coming to Chicago from Pennsylvania. Steel is fairly active, an

independent mill seeking heavy melting and shovelling. A rush of demand is expected at an early date, in view of the rate of consumption. Lists have been issued by the Pennsylvania and Soo lines and the New York Central and Erie ask prices on blank lists.

We quote for delivery in buyers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

	Per Gross Ton
Old iron rails	\$38 to \$39.00
Relaying rails	60.00
Old carwheels	29.00
Old steel rails, rerolling	34.00
Old steel rails, less than 3 ft.	34.00
Heavy melting steel	29.00
Frogs, switches and guards, cut apart	29.00
Shoveling steel	29.00
Steel axle turnings	22.00 to 23.00

	Per Net Ton
Iron angles and splice bars	\$34.82
Iron arch bars and transoms	\$40.50 to 41.50
Steel angle bars	29.00 to 30.00
Iron car axles	41.52
Steel car axles	41.52
No. 1 railroad wrought	29.75 to 30.36
No. 2 railroad wrought	27.50 to 28.00
Cut forge	27.50 to 28.00
Pipes and flues	23.50 to 24.00
No. 1 busheling	26.00 to 26.50
No. 2 busheling	17.50 to 18.00
Steel knuckles and couplers	30.36
Coil springs	30.36
No. 1 cast scrap	27.00 to 27.50
Boiler punchings	32.00 to 33.00
Locomotive tires, smooth	37.00 to 38.00
Machine-shop turnings	15.50 to 16.00
Cast borings	15.75 to 16.25
No. 1 cast scrap	27.00 to 27.50
Stove plate and light cast scrap	23.00 to 23.50
Grate bars	23.00 to 23.50
Brake shoes	23.50 to 24.00
Railroad malleable	29.50 to 30.00
Agricultural malleable	28.00 to 29.00
Country mixed scrap	19.50 to 20.00

Birmingham

BIRMINGHAM, ALA., June 3.

Pig Iron.—The feature of the Birmingham iron market during the week was receipt on the part of two large interests of an inquiry from the Government for 180,000 tons of pig iron for itself and the British allies. Specifically, the inquiry asks for 130,000 tons of basic for the British. Neither of the makers desires to participate in the contract, saying that they have all they can well attend to without this. However, if the Government insists, there will probably be some diversion of metal from regular consumers. One of the interests alluded to has three furnaces on basic, and it is understood that 90 per cent of this basic goes into war order products. Advanced freight rates will raise the cost of making pig iron in the Birmingham district around \$1 to \$2 per ton and makers naturally look to revised selling figures on July 1. It is expected that the establishment of industrial zones, of one of which Birmingham is a center, will result in concentration within the zones of raw materials produced in the zones, which suggests an increase in home consumption of iron and steel and decrease in outward movements. One hears of absolutely no sales, but the iron continues to move from yards in quantities. One of the largest foundry producers said: "It looks very much like a pig iron famine. I do not see how it can be prevented." The Alabama Co., which is in good form for raw materials, has blown in its second stack at Gadsden and has one other there and one at Ironaton in operation. Car movements are excellent, due largely to heavy loading. We quote per gross ton, f.o.b. Birmingham district, as follows:

No. 2 foundry and soft	\$33.00
Basic	32.00

Cast Iron Pipe.—The Bessemer soil pipe plant has resumed with a good quota of orders, it is understood. A small order of pipe from Beaumont, Tex., was received. The spurt in purchase of sanitary pipe passed in a week. Many consumers of water pipe made effort to get in under the old price of \$49 when the recent raise to \$55 was made, but without avail.

Coal and Coke.—Judging from reports from many mines and coking plants, production is under that of last year at this time. Coal comes nearer holding its own, but beehive ovens are not up to the same time

last year owing to labor shortage. Shipments are made of all product without difficulty.

Old Material.—The scrap dealers are putting in a good deal of new material and are looking for advances under the July revision, as they will have to pay more to assemble the material and more for delivery. Meanwhile the price list remains as it has been for some time. We quote, per gross ton f.o.b. Birmingham district yards, prices to consumers, as follows:

Old steel axles.....	\$32.00 to \$33.00
Old steel rails.....	27.00 to 27.50
Heavy melting steel.....	25.50 to 26.00
No. 1 railroad wrought.....	31.00 to 32.00
No. 1 cast.....	27.00 to 27.50
Old carwheels.....	28.00 to 29.00
Tramcar wheels.....	21.00 to 25.00
Machine shop turnings.....	15.00 to 16.00
Cast iron borings.....	15.00 to 16.00
Stove plate.....	23.00 to 24.00

St. Louis

ST. LOUIS, June 3.

Pig Iron.—Representatives of the furnaces are finding little to do these days other than to look after business already under contract, act as traffic men and occasionally sell small odd lots which develop in the course of runs, and whose disposition does not interfere with Government requirements. Local industries and those in the St. Louis territory generally are beginning to make inquiries as to where they stand under the Government order as to pig iron, and are referred for the most part to the Government authorities for that information which naturally depends upon the relation of the industries to the Government's needs. Output of most of the foundries and of the larger industries, too, is mostly controlled by the supply of labor, which is short, and it is doubtful whether more than 65 to 70 per cent of the whole capacity is operating. In the steel division, however, the percentage of operation is considerably higher because of the Government needs.

Coke.—Very little is to be said of the coke market, as there is nothing in the way of supplies for the ovens' representatives to offer, either bee-hive or by-product, though old customers with or without contracts are being given assurances that they will be looked after during the last half to the best of the producers' ability, and that new customers will not be permitted to take supplies of fuel needed by old customers. No new business is appearing in the market, though some interest is attaching to the developments during the current month as this is the period during which the annual contracts for the most part expire.

Finished Iron and Steel.—In finished products the transactions are being limited more than ever to essential needs and to products in stock which, already manufactured, are not especially required for Government needs. This leaves very little upon which to do business and therefore actual transactions are much below the demand. Stock out of warehouse is being moved under these conditions, while there is nothing being done in the way of new contracts for future delivery from the mills which are not in position to do anything for their customers outside of what the Government permits. For stock out of warehouse we quote as follows: Soft steel bars, 4.17c.; iron bars, 4.17c.; structural material, 4.27c.; tank plates, 4.52c.; No. 8 sheets, 5.47c.; No. 10 blue annealed sheets, 5.52c.; No. 28 black sheets, cold rolled, one pass, 6.52c.; No. 28 galvanized sheets, black sheet gage, 7.77c.

Old Material.—The scrap market shows a spotted condition with some items in demand and others impossible of disposal. The steel grades are wanted badly, and all that can be obtained is being taken freely by melters, but there is very little delivery possible, with the result that transactions are limited in volume. Dealers have been doing some buying during the week, but are dependent upon labor and loading conditions for delivery. They have also been expending considerable effort in getting shipments for out-of-town points under way in order to avoid the advance in freight rates on stock purchased or in yards and under con-

tract of sale. The local industries are busy in the steel lines, but the rolling mills have little to do relatively, but at the best the steel concerns are far from capacity because of the labor and material conditions, which hold the output down. Lists from the railroads are due during the week, as is usual during the first portion of the month, but none have appeared so far. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton	
Old iron rails.....	\$36.50 to \$37.00
Old steel rails, rerolling.....	33.50 to 34.00
Old steel rails, less than 3 ft.....	31.00 to 31.50
Relaying rails, standard sections, subject to inspection.....	60.00 to 65.00
Old carwheels.....	28.50 to 29.00
No. 1 railroad heavy melting steel scrap.....	28.00 to 28.50
Heavy shoveling steel.....	26.50 to 27.00
Ordinary shoveling steel.....	26.00 to 26.50
Frogs, switches and guards cut apart.....	28.50 to 29.00
Ordinary bundled sheet scrap.....	22.50 to 23.00
Heavy axle and tire turnings.....	20.50 to 21.00
Per Net Ton	
Iron angle bars.....	\$33.00 to \$33.50
Steel angle bars.....	27.00 to 27.50
Iron car axles.....	40.00 to 40.50
Steel car axles.....	40.00 to 40.50
Wrought arch bars and transoms.....	40.00 to 40.50
No. 1 railroad wrought.....	28.50 to 29.00
No. 2 railroad wrought.....	28.00 to 28.50
Railroad springs.....	28.50 to 29.00
Steel couplers and knuckles.....	29.50 to 30.00
Locomotive tires, 42 in. and over, smooth inside.....	36.00 to 36.50
No. 1 dealers' forge.....	26.00 to 26.50
Cast iron borings.....	15.00 to 15.50
No. 1 busheling.....	25.00 to 25.50
No. 1 boilers, cut to sheets and rings.....	22.00 to 22.50
No. 1 railroad cast scrap.....	25.50 to 26.00
Stove plate and light cast scrap.....	20.00 to 20.50
Railroad malleable.....	26.00 to 26.50
Agricultural malleable.....	25.00 to 25.50
Pipes and flues.....	23.00 to 23.50
Heavy railroad sheet and tank scrap.....	22.50 to 23.00
Railroad grate bars.....	20.00 to 20.50
Machine shop turnings.....	15.50 to 16.00
Country mixed scrap.....	19.00 to 19.50
Uncut railroad mixed scrap.....	23.50 to 24.00

Buffalo

BUFFALO, June 3.

Pig Iron.—There is a continued and increasing lack of surplus iron of any kind to apply on non-war orders; even off grade iron is being fully utilized for indirect war purposes, and furnace product is going out only on Government priority orders. There is a pronounced shortage of basic and low phosphorus grades, Government requirements using up all output of steel making iron. By Government direction, producers are obliging consumers to state the kind of essential work they are engaged upon and the tonnage of iron required. Many foundries are compelled to use a larger proportion of scrap iron and steel than ever before, owing to the lessening tonnages of pig iron procurable and are settling to the conviction that this condition is likely to prevail during the period of the war. We quote the present schedule of Government prices, f.o.b. furnace, Buffalo, as follows:

No. 1 foundry, 2.75 to 3.25 silicon.....	\$34.50
No. 2 X, 2.25 to 2.75 silicon.....	33.50
No. 3 foundry, 1.75 to 2.25 silicon.....	32.50
Gray forge.....	32.00
Malleable.....	33.50
Basic.....	32.00
Lake Superior charcoal, regular grades, f.o.b. Buffalo.....	37.50

Finished Iron and Steel.—Large tonnages of shell steel material are being allocated to various mills by the Government for shipment to Canada to be manufactured into shells for the use of the U. S. Government and for the use of our Allies. The placing of these large orders has stimulated the munitions business in Canada, and it is reported that a number of plants engaged in these lines are making records in turning out finished product. Restrictions on plate exports has caused an advance in the price of plates in Canada, and it is reported that as high as 10c. per pound has been offered for plates that can be shipped from stock. The mills of the district are running 100 per cent capacity on Government work in all lines, and producers are conforming to the Government requirement that weekly reports be furnished by them showing

all shipments of finished products, the amounts shipped for Government work, and also tonnages shipped for commercial or non-war purposes, if any. The manufacturer of "non-essentials" is finding it more and more difficult to secure material, as Government restrictions are more and more closely drawn as to disposition of output, constantly limiting the channel of supply. The demand for forgings for ship work is heavy. The John W. Cowper Co., Buffalo, has received the contract for the erection of an addition to the plant of the Contact Process Co., manufacturer of acids, on the Buffalo River, taking a small tonnage of structural steel.

Old Material.—The demand for all grades of scrap is heavy and numerous sales have been closed for consumption in the district and for shipment to outside points. The demand for shell steel turnings has been especially urgent. The supply of this commodity is increasingly large from a number of shell manufacturing plants in the district; but these turnings are being used in growing ratio by mills which never before used them. The inquiry from the Pittsburgh district has been unusually heavy this week, more than dealers are able to satisfy, local demand requiring a large proportion of all that can be supplied. Some of these inquiries state purchasers will agree to pay the difference in freights to nearest consuming point in addition to the Government price. This has been permissible heretofore by means of Government permits, but advantage had not been taken of the privilege to any great extent. Several railroad lists of good size covering various commodities are before the market and will be closed this week. There is no change in the price schedule, which is as follows, f.o.b. Buffalo:

Heavy melting steel.....	29.00
No. 1 low phosphorus, heavy, 0.04 and under..	39.00
Low phosphorus, 0.04 and under.....	36.50
Low phosphorus, not guaranteed.....	34.00
No. 1 railroad wrought.....	34.00
No. 1 railroad and machinery cast.....	34.00
Iron axles	\$44.00 to 46.00
Steel axles	44.00 to 46.00
Carwheels	29.00
Railroad malleable	34.00
Machine shop turnings.....	17.00 to 17.50
Heavy axle turnings.....	24.00
Clean cast borings.....	18.00 to 19.00
Iron rails	36.00 to 37.00
Locomotive grate bars.....	24.50 to 25.00
Stove plate	24.50 to 25.00
Wrought pipe	27.00 to 28.00
No. 1 busheling scrap.....	29.00 to 30.00
No. 2 busheling scrap.....	21.00 to 23.00
Bundled sheet stamping scrap.....	21.00 to 23.00

Philadelphia

PHILADELPHIA, June 4.

Allocation of orders for plates and shapes for cars and locomotives is being made this week. Specifications have been changed to include Bessemer steel, which will be used in a number of instances. The quantity of plates needed for the 1000 or more locomotives ordered is about 35,000 tons. The pig-iron market is in a waiting attitude, and will remain so until the results of the pig-iron survey are announced. The question of who will pay the freight rate advance on iron and steel scrap is an interesting one inasmuch as scrap is sold on a delivered basis. The consumer is not allowed to pay above the maximum figures, and the loss due to higher freight rates after June 25 must be settled between the producer and the shipper of the scrap.

Coke.—There is nothing new in the coke situation. Very little complaint is now heard from furnaces or foundries as to insufficient coke supply. We quote 48 hr. furnace coke at \$6 and 72 hr. foundry coke at \$7, f.o.b. Connellsburg ovens.

Pig Iron.—Sellers of pig iron are marking time until the completion of the pig-iron survey by the Pig Iron, Ore and Lake Transportation Committee of the American Iron and Steel Institute is completed. Meanwhile, no sales are being made. There is some discussion as to the effect of the freight-rate advance upon costs of producing iron, but nothing definite is heard as to whether makers of iron will consider the higher costs a sufficient justification for an appeal to the War In-

dustries Board for higher prices. The matter probably will be discussed at an early meeting of the Eastern Pig Iron Association. We quote standard grades of iron f.o.b. furnace, except Virginia iron, for which the delivered prices are quoted:

Eastern Pennsylvania No. 1 X.....	\$34.50
Eastern Pennsylvania No. 2 X.....	33.50
Eastern Pennsylvania No. 2 foundry.....	33.00
Virginia No. 2 X (including freight).....	36.77
Virginia No. 2 foundry (including freight).....	36.27
Basic	32.00
Gray forge	32.00
Bessemer	35.20
Standard low phosphorus	53.00
Low phosphorus (copper bearing).....	50.00

Ferroalloys.—A sale of 1000 tons of spiegeleisen, 18 to 22 per cent, for spot delivery at \$82 per ton, f.o.b. furnace, is reported. Small lots of 16 to 18 per cent for prompt delivery are quoted at \$75 to \$76, and these prices are generally effective for last half business also. In fact, makers of spiegeleisen are not disposed to consider spot business unless it is coupled with last half business. A leading producer of spiegeleisen, which has held its price at \$70, although having had little to sell, now announces that its price for last half will be \$75, f.o.b. furnace. Ferromanganese remains firm at \$250, f.o.b. furnace, freight allowed, for any delivery. The Worth Steel Co., Claymont, Del., which has a new steel plant and plate mill, is arranging for a few carloads of ferromanganese for its initial operations.

Semi-Finished Steel.—The Cambria Steel Co. has received an allocated order for 15,000 tons of sheet bars to be shipped to the Sparrows Point plant of the Bethlehem Steel Co. There is nothing to report on billets and slabs. We quote 4 x 4-in. open-hearth re-rolling billets at \$50.50, Philadelphia.

Finished Iron and Steel.—The McClintic-Marshall Co. will build one or two new fabricating shops at the behest of the Emergency Fleet Corporation for fabricating material for the Hog Island shipyard. One of these plants will be located at Pottstown, Pa., and the other may be at Pittsburgh. Orders for fabricated material for the 60 7500-ton ships, which the Hog Island yard will build after its first contracts for 120 ships are completed, will be given to fabricating shops shortly. Orders are being allocated this week for plates and shapes for the cars and locomotives contracted for by the Railroad Administration. Specifications have been changed to include Bessemer steel, and this will be furnished in a number of instances. Plates for locomotives total about 35,000 tons. It is not known yet what will be done with regard to the 68,000 tons of special 9-in. channels, for which new rolls would have to be provided. Several steel makers have reported to the Railroad Administration that the car program will be greatly delayed if this specification is insisted upon, and they have urged the Government to change the order to some shape for which there are rolls now available. Railroad orders for boiler, firebox and tank plates now receive prompt acceptance by the mills without special priority instructions from Washington, the mills having been told to regard these orders as essential material. This is done principally to speed up repair work on locomotives and cars. The New York Shipbuilding Corporation, Camden, N. J., has let about 15,000 to 20,000 tons of structural material to the McClintic-Marshall Co. and L. F. Shoemaker & Co. for shops and crane runways at its shipyard. The Newport News Shipbuilding & Dry Dock Co., Newport News, Va., will be in the market for a good-sized tonnage for new shops at Richmond, Va. The Bethlehem Steel Co. has been seeking the assistance of fabricators in getting early completion of new ore bridges to replace two that were destroyed by wind last week. Very few orders from jobbers, with priority certificates, have come to the mills. Those received are mainly for sheet steel and carry the rating of B1. It is explained that B1 does not mean that all of the A numbers must be taken care of first, but some lots of B1 material are frequently rolled along with similar sizes having a higher rating. Some of the shape mills have been able to store fair tonnages of short lengths, which may become available for jobbers' stocks unless the Government finds other uses for them. We quote plates at 3.25c.; plain material at 3c.; No. 10 blue annealed sheets

at 4.25c.; No. 28 black sheets at 5c.; No. 28 galvanized sheets at 6.25c.; soft steel bars at 2.90c., all Pittsburgh, and bar iron at 3.685c., Philadelphia.

Old Material.—An interesting question has been created for the scrap trade by the advance in freight rates, effective June 25: Who is to pay the additional freight? Obviously, the consumer cannot pay more, because the Government price regulations forbid him to exceed the maximum figures, which have been charged in most instances on orders taken for delivery after June 25. Therefore, the question of who pays the freight-rate advance must be decided between the producer of the scrap and the shipper. In the case of the railroads, which now are selling practically all of their scrap direct to consumers, they must pay the freight, and this will cut into their profits on scrap, although the amount will be returned to them in freight rates. Some farsighted dealers made buying contracts with a clause which protects them on the freight-rate advance, but others bought at a flat price, and they have written to W. Vernon Phillips, chairman of the Sub-Committee on Scrap Iron and Steel of the American Iron and Steel Institute, for a ruling as to whether they should stand the freight-rate advance, or whether the amount should be deducted from the price paid to the producer for the material. In each case, Mr. Phillips has advised that the dealer, regardless of the contracts he has with producers, should not pay more than the maximum prices at the consuming point. In other words, if he has bought heavy melting steel in New England for shipment to eastern Pennsylvania at \$26.16, which with the \$2.84 freight rate, is equivalent to \$29, delivered at eastern Pennsylvania steel plants, he must now pay, under the new rate, only \$25.45, as the new rate will be \$3.55. These figures are not inclusive of the freight tax. Steel plants complain of the quality of scrap they are receiving, but rejections are few because of their great need. The large demand for low phosphorus material and other special grades of scrap has robbed steel-making grades of much material which formerly went to the steel plants. We quote for delivery at eastern Pennsylvania consuming points as follows:

No. 1 heavy melting steel.....	\$29.00
Steel rails, rerolling.....	34.00
No. 1 low phosphorus heavy 0.04 and under.....	39.00
Low phosphorus, 0.04 and under.....	36.50
Low phosphorus (not guaranteed).....	\$33.00 to 34.00
Old iron rails.....	39.00
Old carwheels.....	29.00
No. 1 railroad wrought.....	34.00
No. 1 yard wrought.....	33.00
Country yard wrought.....	29.00
No. 1 forge fire.....	26.00 to 27.00
Bundled skeleton.....	26.00 to 27.00
No. 1 busheling.....	31.00
No. 2 busheling.....	17.00 to 18.00
Turnings (for blast furnace use).....	17.50 to 18.00
Machine shop turnings (for rolling mill use).....	18.50 to 19.00
Cast borings (for blast furnace use).....	17.50 to 18.00
Cast borings (clean).....	19.00
No. 1 cast (for steel plant use).....	29.00
No. 1 cast (cupola sizes).....	33.00 to 34.00
Grate bars.....	24.00
Stove plate.....	24.00 to 25.00
Railroad malleable (for steel plants).....	28.00 to 29.00
Railroad malleable (for malleable works).....	31.00 to 32.00
Wrought iron and soft steel pipes and tubes (new specifications).....	33.00
Ungraded pipe.....	29.00

San Francisco

SAN FRANCISCO, May 28.

The mills and foundries are waiting upon the Government. The latter especially are not working to capacity as they are expecting orders from the Government that will take their entire ability to fill, and all outside orders are being booked subject to delay. The mills have had some large orders for export, but in the main these are being declined because of the anticipated requirements. Labor is evidently preparing to make additional demands in practically every craft, and the California Metal Trades Association is in session this week to consider these demands. The most important development of the month is the getting together of the dealers and consumers of scrap. At a

meeting held on May 15, representatives of the California Foundrymen's Association of the steel and iron mills of the Associated Iron and Metal Dealers of the bay cities entered into an agreement that fixes the price of scrap iron and steel upon the quotations issued by the American Iron and Steel Institute. The meeting was called by Emory Smith of the United States Shipping Board, and action will be taken at once, it is said, that will prevent future hoarding of scrap iron and steel for speculation. This agreement is in accord with a policy of co-operation instituted throughout the country to release hoarded iron and steel for Government use. One result of the meeting will be to educate the producers as to what they can secure for their scrap at consuming centers, based upon the Government's maximum price as announced from time to time from Washington. The Government will be asked to appoint a Federal administrator to enforce the Federal regulations and the terms of the present agreement. The agreement went into effect at once, and all members of the associations concerned have been notified of its provisions.

The jobbers have been informed that they will be allowed preferred treatment at the mills on orders for replacement of stocks sold to the Government or for Government use. They are watching their sales very carefully, but as yet they have not decided to refuse all orders for other than Government use. If their stocks become seriously depleted under the present plan, they may adopt the plan of demanding a statement of the use to which each purchaser is to put his purchases and decline all not for ultimate Government use.

Bars.—While the supply of bars seems adequate at the present time, neither the makers nor dealers are booking any new orders for more than small lots. To a considerable extent, this is because of the anticipated demand for bars in the concrete ships which are expected to be built in large quantities on this coast and also because of the expected demand for forging ingots.

Structural Materials.—Local building requiring structural is at an end. The construction of the steel viaduct across the Embarcadero at the foot of Market Street in front of the Ferry Building has been indefinitely postponed. All contracts had been let for the structure including the excavating, but the mill having the order for the structural steel announced that its Government work was so heavy that it could not promise delivery.

Plates.—Almost no plates are coming in for use other than Government. The jobbers say that their stocks are nearly exhausted and that they are selling almost exclusively for Government use.

Sheets.—There is no change in the sheet situation. The jobbers receive an occasional shipment, most of which is contracted for before its arrival, and practically all of which goes into Government work directly or indirectly.

Wrought Pipe.—The demand for wrought pipe remains greater than the supply. This excess demand comes from the oil fields, and drilling operation is being held up in some cases owing to the shortage.

Cast-Iron Pipe.—The announcement of an advance of \$6 in the price of cast-iron pipe, caused some uneasiness among the dealers. The pipe was hard to place at \$49, and the increased price is not expected to bring about an increased demand.

Pig Iron.—Pig iron is coming into this market on old contracts five or six months late in delivery. Some new contracts have been offered, but the pig is said to be of inferior grade. It is also said that some local brokers have offered some pig for furnace shipment as high as \$40.

Coke.—Coke is still coming in, very much delayed, on old contracts. No new contracts have been entered into so far as can be learned. Some of the coke which started under these old contracts has been diverted since it was learned that it was not to be used for Government purposes.

Old Materials.—The amount of scrap coming into this market does not seem to have been influenced by

tightening of the marketing lines. Scrap has been going rather freely to Hawaii and exported from there. The War Trade Board has just announced that hereafter the board will not issue licenses for the export from Hawaii of scrap iron originating in the United States. We quote:

Heavy melting steel, per gross ton.....	\$29.00
No. 1 cast iron (cupola size).....	34.00
Country mixed scrap, paid by dealers.....	22.00

British Steel Market

Active Demand for Pig Iron with Improved Deliveries to Italy—Ferromanganese Firm

(By Cable)

London, England, June 5.

Pig iron is in active demand and deliveries are more satisfactory with greatly improved clearances of hematite iron for Italy. American semi-finished steel is nominal. Tin plates are irregular at 32s 9d maximum basis but have been offered down to 32s. Ferromanganese is firm.

Toluol is quoted at 2s 4½d with benzol nominally unchanged. We quote as follows:

Tin plate coke, 14 x 20; 112 sheets, 108 lb., f.o.b. Wales, 32s. Ferromanganese, \$260, c.i.f. for export to America; £26 10s for British consumption. Ferrosilicon, 50 per cent, c.i.f., £35 upward. On other products control prices per gross ton are: Hematite pig iron, East Coast, £6 2s 6d; West Coast, £6 7s 6d. Cleveland pig iron, £4 15s to £4 19s. Steel plates, ship, bridge and tank, £11 10s. Steel sheets, black plate, all open annealed, produced in sheet mills, £16 to £18. Bar iron, standard quality, £13 17s 6d; market, £16. Sheet and tin plate bars, £10 7s 6d. Blooms and billets for rerolling (ordinary), £10 7s 6d; special quality, £11.

Gas Strip Prices Fixed—Tin-Plate Market Stronger—Ferromanganese to America Higher

(By Mail)

LONDON, ENGLAND, May 7.—Fundamental conditions disclose no change, but congested order books are as numerous as ever and new business is being negotiated sparingly. Most merchant inquiries have to be turned down to enable concentration on essential needs.

The pig-iron market is very firm and maximum rates are readily conceded by users whose chief concern is to secure supplies. Transport conditions have improved distinctly and the resultant more adequate deliveries of Cleveland iron, especially to Scotland, have proved a welcome feature, while the May allocations are more liberal. Considerable stocks are held by some makers, the whole of which are needed to keep pace with current home and export requirements. The strain on rail transport has been relieved by dispatch coastwise. Demand for all kinds of iron is active, while foundry grades, outside of the Cleveland district, are scarce owing to the forcing of the output of basic iron. The deliveries of hematite are carefully regulated. More iron went abroad last month from the East Coast, although the exports of finished material were smaller.

Semi-finished steel is unchanged, very little surplus being left of the home output after national needs are supplied, and there is thus no relief in sight in the absence of offers of American material.

In finished steel official price control is being extended. Negotiations were completed recently in regard to gas strip, which was fixed at £15 5s. net, makers' works, and other uncontrolled materials may be added to the list. The tendency is stringent, with current demands outstripping capacity. The output of shipbuilding material is being increased in order to cope with the large demand. It is understood that the Broken Hill Proprietary Co. has now begun to turn out steel plates at New Castle, Australia.

The tin-plate market is stronger, chiefly owing to the precarious tin position and the great difficulty in securing the metal. The mills contend that the current official settlement price of tin upon which the

maximum basis is fixed for their product is rather fictitious, as purchases for some little time past could only be effected privately at a considerable premium over the official price. The maximum basis for cokes, 20 x 14, net, makers' works, has, in accordance with the regulations, risen automatically to 33s. 6d., based on tin at £380, and there are now but few sellers below 33s. 6d., whereas purchases could easily be made recently at 1s. to 1s. 6d. discount. Since the completion of the last big French orders for 140,000 boxes, a Portuguese order for about 10,000 boxes was booked, and general business is quiet. There is an inquiry for heavy oilplates for the Eastern trade. The general position is certainly firmer than for months past, makers being more reluctant sellers forward.

Ferromanganese has ruled firmer, the feature being the advanced terms paid for the States and Canada at \$255 to \$260 c.i.f. Atlantic ports, although not a great deal of business has gone through. Trading with Continental Allies and neutral countries is restricted, prices remaining at £60 f.o.b. for loose, with £2 extra for packed.

Addressing the meeting of the shareholders of the Barrow Hematite Steel Co. recently, the chairman said that the company's output of pig iron in 1917 broke all records and that they had probably produced 75 per cent of the special low phosphorus iron manufactured in Great Britain, although they had not been allowed to work their Bessemer plant since the beginning of the war. It had been a matter of prime policy to have their blast-furnace plant modernized. What was being done had proved successful with companies similar to their own and would have the effect of materially reducing the price of steel.

As already cabled [THE IRON AGE, May 9, 1918], a fusion of interests has been decided between Baldwins, Ltd., and the Brymbo Steel Co., Ltd., who have jointly acquired large iron-ore deposits in Oxfordshire, an enterprise as to which high expectations are entertained. Treasury sanction has been obtained to a proposed issue of new shares and in order to carry out the financial operations involved by this amalgamation it is intended to raise the authorized share capital from £1,250,000 to £4,000,000.

As already advised by cable [THE IRON AGE, Apr. 24, 1917] the foundries, blast furnaces, iron ore mines and collieries of Cochrane & Co., of Middlesbrough, have been absorbed by the East Coast Steel Corporation, a combination of interests identified with the Furness group of which Lord Furness is chairman and Benjamin Talbot, the managing director. The Cochrane firm came into existence about 70 years ago, and also owns the Ormesby Ironworks, which has a large output of pig iron and cast iron pipes, besides producing girders, tank plates and segments as well as castings of all kinds. The purchase price of the Cochrane properties has not transpired.

Cleveland

CLEVELAND, June 4—(By Wire).

Iron Ore.—The advance in freight rate of 30c. a net ton on iron ore has aroused ore firms to united efforts to have ore prices advanced July 1. The matter has already been taken up through H. G. Dalton, chairman of the Pig Iron, Ore and Lake Transportation Committee of the American Iron and Steel Institute. The freight advance falls entirely on producers, as the McAdoo order stipulates that the entire rate increase shall be on shipments from the mines to upper Lake ports and ore prices are delivered prices at Lake Erie docks. This advance increases the delivered cost of ore to the producer 33.6c. per gross ton, and in addition two 10 per cent wage advances have been granted the miners this year. Some ore men declare that to cover these costs and other increased costs of mine operations ore prices should be advanced 75c. per ton. Ore shipments by water during May amounted to 8,792,231 gross tons. This remarkably good record exceeded expectations, as the movement was only moderate early in the month. However, it has been very heavy the past two or three weeks. During May, 1917,

shipments were 6,283,613 gross tons. The movement to June 1 was 9,028,101 tons, as compared with 6,495,144 tons during the same period a year ago, and 10,107,991 tons up to June 1, 1916. The May movement broke all records for the month. Shipments to June 1 show a falling off as compared with two years ago because boats got an early start in that year and carried over 1,500,000 tons in April.

We quote, f.o.b. Cleveland lower lake ports, as follows:

Old range Bessemer, \$5.95; old range non-Bessemer, \$5.20; Mesaba Bessemer, \$5.70; Mesaba non-Bessemer, \$5.05.

Coke.—There is very little Connellsburg coke available for the last-half delivery, for which there is some inquiry. There is a moderate demand for prompt shipment by-product foundry coke which is being supplied by a Cleveland furnace interest at the Government price. Shipments are good.

Pig Iron.—Unless pig iron consumers return without further delay to the furnaces supplying them with iron the questionnaire sent out by the pig iron committee properly filled out with data showing for what product their iron is used, they are to be put in the non-essential class and their supply of pig iron will probably be cut off. Last week H. G. Dalton, chairman of the pig iron committee, sent a circular letter to the producers, requesting them to ask their customers to promptly comply with the request for their reports and suggesting that the customers be further advised that if they did not report by about June 6 they would be considered to be engaged on non-Governmental work, and so reported to the committee by the furnaces. In this letter Mr. Dalton said: "I believe if there is further delay in hearing from them (the consumers) that the Department of Steel Supply will support us in our contention that their work must be non-essential; otherwise they would be more interested in making their reports promptly." Complying with the suggestion of Mr. Dalton, the blast furnaces have sent appeals to those of their trade who have not replied, asking them to hurry along their reports. Some consumers in the foundry trade are being delayed in filling out their blanks, as they do not know in all cases for what purpose the castings are used and are finding it necessary to communicate with the buyer. Only a few blast furnace reports have as yet reached the pig iron committee, but these and reports from consumers that have reached the producers do not warrant any change in the estimate made from preliminary returns last week that indicated that about 80 per cent of the pig iron output is being consumed in essential work. Estimates of the pig iron requirements of the Government range from 75 to 90 per cent. Reports from foundries indicate that many largely engaged on Government work will need a great deal of additional iron for the last half. One Cleveland gray iron foundry reports that it will need 9000 tons and several other foundries have already indicated that they will need lots of several thousand tons. The demand upon the Government for iron, particularly for steel-making purposes, continues heavy. Among the larger lots that came up for allocation during the week by the pig iron committee were the following: 17,500 tons of basic and 8400 tons of Bessemer for a Midland, Pa., plant, June-December delivery; 1500 tons of Bessemer iron for a Braddock, Pa., plant for July-August delivery; 900 tons of Bessemer iron for a Pittsburgh plant, June-August delivery, for railroad work; 500 tons No. 2 X for a Baltimore foundry, June-August delivery; 300 tons of foundry iron, June-August delivery, and 500 tons of foundry iron for prompt shipments for Pittsburgh plants; 2400 tons of No. 2 X for a Wilmington, Del., plant, and 1800 tons for another Delaware plant, both June-November delivery; and 2500 tons of No. 2 X for a Plattsburg, N. Y., foundry for the remainder of the year. Some high sulphur Southern foundry iron is available and several sales in lots of 500 tons and under are reported, this iron going to foundries that have been unable to secure other grades. Considerable inquiry is coming direct from consumers for low phosphorus, Bessemer ferro-silicon and silvery iron, which furnaces are unable to supply. Cleveland sales agents report sales during the week of approximately 1000 tons of ferromanganese

and 1000 tons of spiegeleisen. We quote, delivered Cleveland, as follows:

Bessemer	.....	\$36.15
Basic	.....	33.30
Northern No. 2 foundry	.....	33.30
Southern No. 2 foundry	.....	37.00
Gray forge	.....	32.30
Ohio silvery, 8 per cent silicon	.....	47.40
Standard low phosphorus, Valley furnace	.....	53.00

Bolts, Nuts and Rivets.—The demand for bolts and nuts continues heavy both in specifications on contracts and new orders. Orders are now being placed by the car builders for bolt and nut requirements for the cars to be built for the Government. Manufacturers are still supplying commercial consumers, but iron instead of steel is being used in the manufacture of most of the bolts going to the commercial trade. Rivet specifications are heavy, and a large volume of small orders is reported. No new business in round tonnages came out during the week.

Old Material.—Dealers are endeavoring to ship as much scrap as possible before the advance in freight rates goes into effect June 25. The car supply is fairly good, and material is being moved in heavy volume. Dealers, however, will suffer considerable losses in extra freight charges on material unshipped when the new tariffs go in effect. This increase will amount to at least 25c. per ton on most material except that which is both produced and consumed in Cleveland. The higher rate will add about \$1 a ton on some scrap that has a long haul. For example, shell turnings are being shipped here at a present freight rate of \$3.80 from New Jersey points. The market is quiet. Speculative buying and selling is eliminated by Government price control, and many consumers are not buying scrap for extended future delivery. Turnings are slightly easier. Other prices are unchanged. We quote, delivered at consumers' yards in Cleveland and vicinity, as follows:

Per Gross Ton		
Steel rails	.....	\$27.00 to \$28.00
Steel rails, rerolling	.....	34.00
Steel rails, under 3 ft.	.....	34.50
Iron rails	.....	39.00
Iron car axles	.....	46.50
Steel car axles	.....	46.50
Heavy melting steel	.....	29.00
Cast borings	.....	18.00 to 18.50
Iron and steel turnings and drillings	.....	17.50 to 17.75
No. 1 railroad wrought	.....	34.00
Hydraulic compressed sheet scrap	.....	28.00 to 29.00
Cast-iron car wheels, unbroken	.....	29.00
Cast-iron car wheels, broken	.....	34.00
Agricultural malleable	.....	24.00 to 25.00
Railroad malleable	.....	34.00
Steel axle turnings	.....	24.00
Light bundled sheet scrap	.....	24.50 to 25.00
Cast-iron scrap	.....	29.00
Cast-iron scrap, broken to cupola size	.....	30.00 to 31.00
No. 1 busheling	.....	29.50 to 30.00

Per Net Ton		
Railroad grate bars	.....	21.00 to 21.50
Stove plate	.....	21.00 to 21.50

Finished Iron and Steel.—Considerable new demand for steel has developed, coming largely from the makers of motor truck parts. One of these inquiries is from an Ohio plant which wants 10,500 tons of electric steel blooms for delivery during the remainder of the year. A Toledo spark plug manufacturer is inquiring for 1000 tons of steel bars. A local ordnance works has placed 30,000 tons of ingots for an additional gun order recently taken. Several implement manufacturers want to place additional specifications, and the orders of those who are covered for only a limited time will be accepted subject to the ability of the mills to make shipments. Some anxiety over future business is felt by small mills that have few orders on their books. While there is a Government demand for the entire product of these mills, the shortage in semi-finished steel may result in the raw steel being used for more essential products, leaving mills not making their own semi-finished steel without orders. The shortage of steel bars has ruled in a heavy demand from forge shops and other consumers for bars rolled from shell discard, and considerable of the capacity of the local rolling mills is being used in rerolling this steel. Mills are also finding a good market for defective cold-rolled Bessemer steel and open-hearth screw stock. The demand for bar iron is active, considerable of this coming from the car companies. The demand on warehouses

continues heavy and jobbers' stocks have been so reduced that they have only 50 per cent of usual sizes, and 25 per cent of tonnage normally carried. There is a heavy demand for woven wire fence, for which mills cannot take orders. Commercial consumers of sheets are having great trouble in placing orders and have about cleaned out jobbers' stock lists.

We quote warehouse prices as follows: Steel bars, 4.03 1/2c.; plates, 4.38 1/2c.; structural material, 4.13 1/2c.; No. 10 blue annealed sheets, 5.35c.; No. 28 black sheets, 6.35c.; No. 28 galvanized sheets, 7.60c.

At present the Trumbull Steel Co., Warren, Ohio, is operating three of its five open hearth furnaces, and expects to put its blooming and sheet bar mills in operation in June. The company is operating practically all of its 33 sheet, tin plate and jobbing mills.

New York

NEW YORK, June 4.

Pig Iron.—The announcement that the United States Government has called for 180,000 tons of Southern basic pig iron for the British government has been received with much interest in this city, as many buyers in the East have purchased Southern iron or had hoped to do so on account of the shortage of Northern grades. One company which stated that it had sold all its pig iron for the remainder of this year was informed that that made no difference so far as the Government was concerned, as the United States and its Allies must have iron regardless of any contracts that had been made. Replies to the questionnaire sent out by blast furnaces and agents to customers have been coming in rapidly and indicate that many of the smaller foundries have only from 35 to 50 per cent Government business, while many of the larger companies have from 75 to 95 per cent. Although buyers are clamoring for pig iron, none is being sold and deliveries are only fair. We quote as follows for tidewater delivery:

No. 1 X	\$35.25
No. 2 X	34.25
No. 2 plain	33.75
No. 1 Southern	\$39.75 to 40.25
No. 2 Southern (rail and water)	39.00 to 39.25
No. 2 Southern (all rail)	39.15 to 39.65
No. 2 X Virginia	37.02

Ferromanganese.—The domestic ferromanganese market is quite active and sales of the past week have run into considerable tonnage, ranging from carloads to 500-ton lots, mostly for delivery over the rest of the year. Inquiry now is not large and it is believed consumers are well covered. The business has been done generally at \$250, delivered, for 70 per cent alloy, plus \$4 for each unit above this standard. April imports were 2575 tons, next to the largest for this year, and those for May were probably no less. Official Government licenses have been granted for the importation of the 12,000 tons of British alloy, recently arranged for. April imports of manganese ore in excess of 58,000 gross tons indicate a good output of ferromanganese for May. One lot of Indian manganese ore sold in the last week at \$1.40 per unit, seaboard, the highest price thus far for any ore. It is stated that arrangements have been perfected whereby 35,000 tons per month of Brazilian ore may be imported, the vessels bringing it going from this country with coal for the Central Railway of Brazil. Spiegeleisen is strong and active at \$70, furnace, for 16 to 18 per cent alloy. Sales of 2000 to 3000 tons are noted for delivery over the rest of the year. One consumer has taken 500 tons and another 600 tons at \$70, furnace, while another has ordered 1000 tons of 18 to 22 per cent alloy, for which around \$82, furnace, is said to have been paid. Ferrosilicon, 50 per cent, is moderately active with about \$150, delivered, the quotation for forward delivery, and up to \$165 per ton asked for spot and prompt. Most consumers are well covered and the demand for prompt is not large. Ferrotungsten is now quoted at \$2.35 to \$2.40 per lb. of contained tungsten, New York, with the ore concentrates selling at between \$20 to \$24 per unit in 60 per cent material. We quote ferrovanadium at \$4 to \$5, Pittsburgh, per lb. of contained vanadium for prompt delivery in small lots, but very little is avail-

able, large quantities going into steel on Government orders. Ferro-carbon-titanium, 15 to 18 per cent, is selling at \$200 per net ton in carload lots, at \$220 per ton in lots between one ton and a carload, and at \$250 per ton in lots less than a ton, f.o.b. Suspension Bridge, N. Y.

Finished Iron and Steel.—In structural steel there is some activity, due to demands of shipyards, railroads and manufacturing plants. The Vulcan Iron Works, Wilkes-Barre, Pa., have awarded an order for 900 tons of fabricated material for a new foundry to the Heddern Construction Co. The Michigan Copper & Brass Co., Detroit, is in the market for 500 tons for a rod mill. The Vermont Milk Chocolate Co., Burlington, Vt., is asking for bids on 200 tons. About 300 tons has been awarded for transfer bridges for car floats at Brooklyn. A number of shipyard projects are under consideration. Car builders note with interest the news that the Railroad Administration, through the steel distributing committee of the American Iron and Steel Institute, is allocating orders this week for plates and shapes for the 100,000 cars ordered by the Government, but they fear it will be many weeks before cars are being turned out. At present the car shops are working far below capacity. Jobbers have not yet received shipments of steel on priority orders, but some of them expect the steel situation to ease up sufficiently within the next 30 days so that part of their requirements may be filled. We quote: Steel bars, 3.095c.; shapes, 3.195c.; plates, 3.445c., and bar iron, 3.695c., all at New York. Out-of-store prices are 1c. higher.

Cast-Iron Pipe.—The city of Cambridge, Mass., has received bids for 140 tons of cast-iron pipe, the two bidders being the United States Cast Iron Pipe & Foundry Co. and R. D. Wood & Co. The contract has not been awarded. It is understood that the new Government prices are being asked and have been paid on small tonnages. These prices are as follows: \$61.35, New York, for 6-in. and heavier and \$64.35 for 4-in.; \$71.35 for 3-in., with \$1 additional for Class A and gas pipe.

Old Material.—The scarcity of nearly all grades of old material is more pronounced and prices are being well maintained. There is an active demand from Pittsburgh and in many cases buyers are paying the difference between the Pittsburgh freight, \$3.30 including tax, and the Eastern Pennsylvania rate, \$1.85, making the additional cost \$1.45 and the total delivered cost to the consumer \$3.45 for heavy melting steel. We quote prices of brokers to New York producers and dealers as follows, per gross ton, New York:

Per Gross Ton	
Heavy melting steel	\$26.00 to \$26.50
Rerolling rails	31.50
Relaying rails	60.00 to 70.00
Iron and steel car axles	44.00 to 44.30
No. 1 railroad wrought	31.50 to 31.80
No. 1 railroad wrought cut to not less than 10 in. or over 24 in.	36.50
Wrought-iron track scrap	29.50
Forge fire	23.50 to 24.00
No. 1 yard wrought long	30.50
Light iron	10.00 to 11.00
Cast borings (clean)	16.00 to 16.50
Machine-shop turnings	16.00 to 16.50
Mixed borings and turnings	15.50 to 16.00
Iron and steel pipe (1 in. minimum diameter), not under 2 ft. long	30.00 to 30.50
Stove plate	22.50 to 23.00
Locomotive grate bars	22.00 to 22.50
Malleable cast (railroad)	31.00 to 31.50
Old carwheels	26.50
Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, are:	
No. 1 machinery cast	\$34.00
No. 1 heavy cast (columns, building materials, etc.), cupola size	34.00
No. 1 heavy cast, not cupola size	29.00
No. 1 cast (radiators, cast boilers, etc.)	\$27.00 to 28.00

The De Messe Welding Apparatus Co., to manufacture welding tools, has been incorporated at Elizabeth, N. J., with a capital of \$25,000. The incorporators are Frederick De Messe, Marcel Lucas, and Robert Zuber of Newark.

Cincinnati

CINCINNATI, June 4—(By Wire).

Pig Iron.—Urgent appeals for iron from foundry melters are coming in at a rapid rate. The foundries are endeavoring to accumulate all iron possible before the advance in freight rates takes place. Furnaces in all districts are working hard to help them out, but the labor shortage is a hindrance in forwarding iron promptly. The car supply appears to be better than for a long time and shipments from the Hanging Rock district are going forward at a more rapid rate than at any time within the past 12 months. Southern furnaces are also forwarding metal much faster than 30 days ago.

Based on freight rates of \$2.90 from Birmingham and \$1.26 Ironton, we quote f.o.b. Cincinnati, as follows:

Southern coke, No. 2 foundry and No. 2 soft.	\$35.90
Southern Ohio, No. 2	34.26
Basic, Northern	33.26

Finished Material.—Barb wire is almost unobtainable. The local jobbers' stocks have been almost entirely exhausted and the manufacturers generally state that 60 days is the best delivery that can be promised. Wire nails are also becoming scarce, and in spite of the slow local building operations the demand for nails is far ahead of the available supply. Galvanized sheets represent another vexing problem for the sheet metal contractors. Some of them have a sufficient supply to carry them through the coming three or four months, but others are unable to secure more than enough to complete contracts in hand. There is still a good demand for reinforcing concrete bars, but the supply is becoming more limited. Shipments of all kinds of structural material are moving very slowly from the mills. Calls for material of this kind are received from not only the principal producing centers, such as Pittsburgh, Cleveland and Chicago, but occasionally an urgent inquiry is received from points as far distant as Omaha. The jobbers recently have been very careful in filling all orders, and are distributing only to firms which are engaged in work that comes under essential industries. The jobbers' quotation on wire nails has been advanced to \$4.20 per keg base.

Jobbers' prices are as follows: Iron and steel bars, 4.08 1/2c.; twisted bars, 4.36 1/2c. base; structural shapes, 4.18 1/2c.; plates, 1/4-in. and heavier, 4.43 1/2c.; No. 10 blue annealed sheets, 5.43 1/2c.; cold rolled shafting, 10 per cent plus list. The mill price on No. 28 black sheets remains at 5.18 1/2c., and on No. 28 galvanized, 6.43 1/2c. The warehouse price on wire nails is now at \$4.20 per keg base.

Coke.—A few sales of carload lots of foundry coke have been made lately, but contracting is at a standstill. The oven operators are straining every nerve to increase the output and now are handicapped only by the labor supply, which is by no means satisfactory. Within the past few days the car supply has been ample and complaints on this score are disappearing. However, this free supply of rolling stock is apt to disappear over night, as this has been the experience of the coke producers in all of the districts supplying this territory within the past two months. Foundries are unable to lay in any stocks of coke, although many of them are anxious to do so. Furnace coke, as far as new contracting is concerned, is not to be had, but shipments on old contracts are moving forward at a satisfactory pace. Domestic coke is not being bought, although it is believed that consumers will soon commence making an effort to lay in a winter's supply. The bulk of the material has something to do with storing the fuel in any large quantity.

Old Material.—While contracting was very brisk the past week, future buying is now slowing down. All melters of scrap are not very well covered far ahead and this slackening in business is looked on as being of a temporary nature. Relaying rails are not as strong as they were, but the supply in this vicinity is so limited that market prices are in reality controlled by conditions in other centers where transactions are reported. Heavy melting steel scrap is in good demand, and No. 1 railroad wrought is also wanted. Borings and turnings are a trifle firmer, but

are unchanged. The following are dealers' prices, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton		
Bundled sheet scrap	.....	\$19.00
Old iron rails	.....	\$33.50 to 34.00
Relaying rails, 50 lb. and up	.....	43.50 to 44.00
Reroiling steel rails	.....	31.50 to 32.00
Heavy melting steel scrap	.....	26.00 to 26.50
Steel rails for melting	.....	27.00 to 27.50
Old carwheels	.....	28.50 to 29.00

Per Net Ton		
No. 1 railroad wrought	.....	\$28.50 to \$29.00
Cast borings	.....	13.00 to 13.50
Steel turnings	.....	13.00 to 13.50
Railroad cast	.....	25.00 to 25.50
No. 1 machinery	.....	25.50 to 26.00
Burnt scrap	.....	17.50 to 18.00
Iron axles	.....	40.00 to 40.50
Locomotive tires (smooth inside)	.....	33.50 to 34.00
Pipes and flues	.....	20.00 to 20.50
Malleable cast	.....	24.50 to 25.00
Railroad tank and sheet	.....	17.50 to 18.00

IRON AND INDUSTRIAL STOCKS

Market Reacts Slowly in Face of German Success in the Champagne

Stock market transactions show that consideration is being given to the military situation, but in a comparatively more stolid way than during the recent German offensive in Picardy. Almost as keen interest is expressed over the prospect of heavier taxation of industry. All steel stocks lost ground the past week, as follows: United States Steel, com., 5 1/2 points; pref., 1/2; Bethlehem Steel, com., 13; class B, 4 1/2; pref. 8's, 2; Colorado Fuel & Iron, 5 1/2; Crucible Steel, com., 3 1/2; Gulf States Steel, com., 2 1/2; Lackawanna Steel, com., 3 1/2; Midvale Steel, com., 4 1/4; Sloss-Sheffield Steel & Iron, com., 2 1/4; Superior Steel, com., 2 1/2; United Alloy Steel, com., 1 1/2; Virginia Iron, Coal & Coke, com., 3.

The range of prices on active iron and industrial stocks from Tuesday of last week to Wednesday of this week was as follows:

Allis-Chalm. com.	32	- 34 1/2	Lackawanna Stl.	81 1/2	- 86 1/2
Am. Can com.	42 1/2	- 45	Lake Sup. Corp.	15 1/2	- 16 1/2
Am. Can pf.	95	- 95 1/2	Lima Loco.	.....	47
Am. Car & Fdry. com.	75	- 79 1/2	Midvale Steel	47	- 51 1/2
Am. Car & Fdry. pf.	110	-	Nat-Acme	30 1/2	- 30 1/2
Am. Loco. com.	62	- 64 1/2	Nat. Enam. & Stm. com.	48 1/2	- 50 1/2
Am. Ship. com.	125 1/2	- 128	N. Y. Air Brake	123	-
Am. Steel Fdry.	62 1/2	- 65 1/2	Pressed Steel com.	58 1/2	-
Bald. Loco. com.	79 1/2	- 90 1/2	Ry. Steel Springs com.	53	- 54 1/2
Beth. Steel, Cl. B	77 1/2	- 84 1/2	Ry. Steel Springs pf.	.....	98
Cambria Steel.	126	- 130	Republic com.	81 1/2	- 87 1/2
Case (J. I.) pf.	85	-	Republic pf.	98 1/2	- 99 1/2
Cent. Fdry. com.	35	- 36	Sloss com.	63 1/2	- 67 1/2
Cent. Fdry. pf.	45	-	Superior Steel	38 1/2	- 40 1/2
Charcoal Iron pf.	6 1/2	-	Tran.-Williams	.....	39
Chic. Pneu. Tool.	65	- 68	U. S. Alloy Steel	39 1/2	- 40 1/2
Colo. Fuel	44 1/2	- 49 1/2	U. S. Pipe com.	14 1/2	- 14 1/2
Cruc. Steel com.	60	- 64 1/2	U. S. Steel com.	96 1/2	- 105 1/2
Cruc. Steel pf.	91 1/2	-	U. S. Steel pf.	109 1/2	- 110 1/2
Gen. Electric	143	- 149	Va. I. C. & Coke	47	- 47 1/2
Gl. No. Ore Cert.	30 1/2	- 32 1/2	Warwick	8	- 8 1/2
Gulf States Steel	84	- 86	West. Elec.	41	- 42 1/2
Int. Har. of N. J. com.	.....	124 1/2-124 3/4			

Dividends

The American Can Co., quarterly, 1 1/2 per cent on the preferred, payable July 1.

The Bethlehem Steel Co., quarterly, 2 per cent on the cumulative convertible preferred, and 1 1/2 per cent on the 7 per cent preferred, payable July 1.

The Canadian Car & Foundry Co., 3 1/2 per cent on the preferred, payable July 15.

The J. I. Case Threshing Machine Co., quarterly, 1 1/2 per cent on the preferred, payable July 1.

The Charcoal Iron Co. of America, quarterly, 20c. on the common, and 30c. on the preferred, payable July 1.

The Dominion Steel Corporation, quarterly, 1 1/2 per cent on the common, payable July 1.

The La Belle Iron Works, quarterly, 3 per cent on the common, and 2 per cent on the preferred, payable June 29.

The Pittsburgh Rolls Corporation, initial dividend of 1 per cent on the common, payable July 1.

The Worthington Pump & Machinery Corporation, quarterly, 1 1/2 per cent on the preferred A and 1 1/2 per cent on the preferred B, payable July 1.

The Yale & Towne Mfg. Co., quarterly, 2 1/2 per cent, payable July 1.

Application has been made to Vice-Chancellor Leaming, Camden, N. J., for the appointment of a receiver for the Goff Pneumatic Brake Co., of the same city.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight rates from Pittsburgh on iron and steel articles, aside from wrought iron and steel pipe in carloads, per 100 lb., New York, 19.5c.; Philadelphia, 18.5c.; Boston, 21.5c.; Buffalo, 11.6c.; Cleveland, 13.5c.; Cincinnati, 18.5c.; Indianapolis, 20c.; Chicago, 21.5c.; St. Louis, 27c.; Kansas City, 47c.; minimum carload, 36,000 lb.; St. Paul, 40c.; minimum carload, 36,000 lb.; Denver, 79c.; minimum carload, 36,000 lb.; Omaha, 47c.; minimum carload, 36,000 lb.; New Orleans, 30.7c.; Birmingham, 46c.; Pacific Coast, \$1.00; minimum carload, 80,000 lb. To the Pacific Coast the rate on steel bars and structural steel is \$1.05, minimum carload, 40,000 lb.; and \$1.00, minimum carload, 50,000 lb. On wrought iron and steel pipe the rate from Pittsburgh to Kansas City is 40c. per 100 lb., minimum carload 46,000 lb.; to Omaha, 40c., minimum carload 46,000 lb.; to St. Paul, 35.5c., minimum carload 46,000 lb.; Denver, 79c., minimum carload 46,000 lb. A 3 per cent transportation tax now applies. On iron and steel items not noted above, rates vary somewhat, and are given in detail in the regular railroad tariffs.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in. angles, 3 to 6 in. on one or both legs, $\frac{1}{4}$ in. thick and over, and zees, structural sizes, &c.

Wire Products

Wire nails, \$3.50 base per keg; galvanized, 1 in. and longer, including large-head barb roofing nails taking an advance over this price of \$2, and shorter than 1 in., \$2.50. Bright basic wire, \$3.35 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$3.25; galvanized wire, \$3.95; galvanized barb wire and fence staples, \$3.65; painted barb wire, \$3.65; polished fence staples, \$3.65; cement-coated nails, \$3.40 base; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 47 per cent off list for carload lots, 45 per cent for 1000-rod lots, and 45 per cent off for small lots, 100 lb. Pittsburgh.

Bolts, Nuts and Rivets

Large structural and ship rivets.....\$4.40 base
Large boiler rivets.....\$4.50
7/16 in. x 6 in. smaller and shorter rivets.....50-10 per cent off list
Machine bolts b.p. nuts, $\frac{1}{8}$ in. x 1 in.
Smaller and shorter, rolled threads.....50-10 per cent off list
Cut threads.....50-5 per cent off list
Larger and longer sizes.....40-10 per cent off list
Machine bolts c.p.c. and t. nuts, $\frac{1}{8}$ in. x 4 in.
Smaller and shorter.....40-10 per cent off list
Larger and longer.....35-5 per cent off list
Carriage bolts, $\frac{1}{8}$ in. x 5 in.
Smaller and shorter, rolled threads.....50-5 per cent off list
Cut threads.....40-10 per cent off list
Larger and longer sizes.....40 per cent off list
Lag bolts.....50-10 per cent off list
Flow bolts, Nos. 1, 2, 3.....50 per cent off list
Hot pressed nuts, sq. blank.....2.50c. per lb. off list
Hot pressed nuts, hex. blank.....2.30c. per lb. off list
Hot pressed nuts, sq., tapped.....2.30c. per lb. off list
Hot pressed nuts, hex., tapped.....2.10c. per lb. off list
C.p.c. and t. sq. and hex. nuts, blank.....2.25c. per lb. off list
C.p.c. and t. sq. and hex. nuts, tapped.....2.00c. per lb. off list
Semi-finished hex. nuts:
5/8 in. and larger.....60-10-10 per cent off list
9/16 in. and smaller.....70-5 per cent off list
Stove bolts.....70-10 per cent off list
Stove bolts.....2.1/2 per cent extra for bulk
Tire bolts.....50-10-5 per cent off list

The above discounts are from present lists now in effect.

All prices carry standard extras.

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, \$57; chain rods, \$65; screw, rivet and bolt rods and other rods of that character, \$65. Prices on high carbon rods are irregular. They range from \$70 to \$80, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes, 9/16 in. x 4 1/2 in. and heavier, per 100 lb., \$2.90, in lots of 200 kegs of 200 lb. each, or more; track bolts, \$4.90. Boat spikes, \$5.25 per 100 lb., f.o.b. Pittsburgh.

Terne Plate

Effective May 21 prices on all sizes of terne plates are as follows: 8-lb. coating, 200 lb., \$15 per package; 8-lb. coating, I. C., \$15.30; 12-lb. coating, I. C., \$17.00; 15-lb. coating, I. C., \$18.60; 20-lb. coating, I. C., \$19.60; 25-lb. coating, I. C., \$20.60; 30-lb. coating, I. C., \$21.75; 35-lb. coating, I. C., \$22.75; 40-lb. coating, I. C., \$24.00 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars at 2.90c. from mill, and 4.50c. to 5c. from warehouse in small lots for prompt shipment. Refined iron bars, 3.50c. in carload and larger lots, f.o.b. mill.

Wrought Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card, as announced Nov. 5 by the Government on steel pipe, those on iron pipe being the same as quoted for some time:

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
$\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$... 44	17 1/2	23	$\frac{1}{4}$ and $\frac{3}{4}$... 23	+4	
$\frac{1}{2}$... 48	33 1/2	24	$\frac{1}{2}$... 23	+3	
$\frac{3}{4}$ to 3 ... 51	37 1/2	28	$\frac{3}{4}$ to 1 1/2 ... 33	10	

Lap Weld		
2 ... 44	31 1/2	1 1/4 ... 18
2 1/2 to 6 ... 47	34 1/2	1 1/4 ... 25
7 to 12 ... 44	30 1/2	2 1/2 ... 26
13 and 14 ... 34 1/2	..	2 1/2 to 6 ... 28
15 ... 32	..	7 to 12 ... 25

Butt Weld, extra strong, plain ends		
$\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$... 40	22 1/2	$\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$... 22
$\frac{1}{2}$... 45	32 1/2	27
$\frac{3}{4}$ to 1 1/2 ... 49	36 1/2	33
2 to 3 ... 50	37 1/2	18

Lap Weld, extra strong, plain ends		
2 ... 42	30 1/2	1 1/4 ... 19
2 1/2 to 4 ... 45	33 1/2	1 1/4 ... 25
4 1/2 to 6 ... 44	32 1/2	2 ... 27
7 to 8 ... 40	26 1/2	2 1/2 to 4 ... 29
9 to 12 ... 35	21 1/2	4 1/2 to 6 ... 28
		7 to 8 ... 20
		9 to 12 ... 15

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variations in weight of 5 per cent. Prices for less than carloads are four (4) points lower basing (higher price) than the above discounts on black and 5 1/2 points on galvanized.

On butt and lap weld sizes of black iron pipe, discounts for less than carload lots to jobbers are seven (7) points lower (higher price) than carload lots, and on butt and lap weld galvanized iron pipe are nine (9) points lower (higher price).

Boiler Tubes

The following are the prices for carload lots, f.o.b. Pittsburgh, announced Nov. 13, as agreed upon by manufacturers and the Government.

Welded Steel	Charcoal Iron
3 1/2 to 4 1/2 in. ... 34	3 1/2 to 4 1/2 in. ... 12 1/2
2 1/2 to 3 1/4 in. ... 24	3 to 3 1/4 in. ... 5
2 1/2 in. ... 17 1/2	2 1/2 to 2 3/4 in. ... 7 1/2
1 1/4 to 2 in. ... 13	2 to 2 1/4 in. ... 22 1/2
	1 1/4 to 1 3/4 in. ... 35

Standard Commercial Seamless—Cold Drawn or Hot Rolled	Per Net Ton	Per Net Ton
1 in. ... \$340	1 1/4 in. ... \$220	
1 1/4 in. ... 280	2 to 2 1/2 in. ... 190	
1 1/2 in. ... 270	2 1/2 to 3 1/4 in. ... 180	
1 1/2 in. ... 220	4 in. ... 200	
	4 1/2 to 5 in. ... 220	

These prices do not apply to special specifications for locomotive tubes nor to special specifications for tubes for the Navy Department, which will be subject to special negotiation.

Sheets

Makers' price for mill shipments on sheets of United States standard gage in carload and larger lots, are as follows, 30 days net or 2 per cent discount in 10 days:

Blue Annealed—Bessemer	Cents per lb.
No. 8 and heavier	4.20
Nos. 9 and 10	4.25
Nos. 11 and 12	4.30
Nos. 13 and 14	4.35
Nos. 15 and 16	4.45

Box Annealed, One Pass Cold Rolled—Bessemer

Nos. 17 to 21	4.80
Nos. 22 and 24	4.85
Nos. 25 and 26	4.90
No. 27	4.95
No. 28	5.00
No. 29	5.10
No. 30	5.20

Galvanized Black Sheet Gage—Bessemer

Nos. 10 and 11	5.25
Nos. 12 and 14	5.35
Nos. 15 and 16	5.50
Nos. 17 to 21	5.65
Nos. 22 and 24	5.80
Nos. 25 and 26	5.95
No. 27	6.10
No. 28	6.25
No. 29	6.50
No. 30	6.75

Tin-Mill Black Plate—Bessemer

Nos. 15 and 16	4.80
Nos. 17 to 21	4.85
Nos. 22 to 24	4.90
Nos. 25 and 27	4.95
No. 28	5.00
No. 29	5.05
No. 30	5.05
Nos. 30 1/2 and 31	5.10

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

May	Lake	Electro-	Tin, New		Lead		Spelter	
			Yonic	York	New York	St. Louis	New York	St. Louis
29	23.50	23.50	•99.00	7.05	6.92 1/2	7.50	7.25	
31	23.50	23.50	•95.00	7.05	6.92 1/2	7.50	7.25	
June								
1	23.50	23.50	•	7.05	6.92 1/2	7.50	7.25	
3	23.50	23.50	•93.00	7.05	6.92 1/2	7.50	7.25	
4	23.50	23.50	•90.00	7.05	6.92 1/2	7.50	7.25	

*Nominal.

New York, June 5.

Moderate activity continues to characterize the markets, firmness being also the rule except in tin. Conditions in copper are unchanged. Tin continues to decline slowly. Lead is firm and strong. Spelter is mildly active and steady. Antimony is dull and unchanged.

New York

Copper.—The market is devoid of significant or interesting news and has settled down to the regular controlled routine for the two and one-half months during which the 23.50c. price for carload and larger lots is to continue to prevail. All sorts of opinions are being offered as to the effect on small producers of the refusal to advance the copper price, so far as its effect on the total output is concerned. Time only will divulge what this will be. The increase in freight rates, so far as they affect copper, is the absorbing topic. Some figure that this will add 1c. per lb. to copper costs. The fact that the increase takes effect June 25 has caused many consumers to urge producers to ship the maximum amount possible before that date. Demand continues phenomenal. The output of the Anaconda Copper Co. in May was about the same as that of March, both months of 31 days.

Tin.—Dullness pervades the market generally. In the last week practically no business has been transacted, due to the sagging tendency of prices which has been predominant for several weeks. Buyers still expect lower quotations and are waiting. Spot tin is nominally lower and is now quoted at about 90c., New York, while future shipment from the Far East is also nominal at close to 85c. per lb. There is an element of strength in the situation in that offerings are restricted and limited. Therefore if a real buying movement should set in, there would not be enough tin to satisfy it, causing a rebound. When such a turn in the market will come it is of course difficult to decide. The bottom may not have been reached yet, and while there is room for further decline, it is the opinion in the trade that it will be a long time before 60c. to 65c. tin is seen again. Arrivals at Atlantic ports in May were 846 tons, with stocks and landing reported at 363 tons. Spot Straits in London yesterday was quoted at £346 per ton, a decline of £9 since a week ago.

Lead.—Scarcity of prompt and nearby metal continues the feature of the market. If anything the strength noted last week has developed further. No lead has been sold in the past week below the leading producer's price of 7c., New York, while the outside market has reported transactions above this level, up to 7.10c. to 7.15c. The market may be quoted at 7.05c., New York, and 6.92 1/2c., St. Louis, for early delivery. Yesterday and Monday a good inquiry is reported, but no large business is stated to have been put through, though there may be later. One large dealer quotes 7c., St. Louis, for June shipment.

Spelter.—There has been very little change in the last week. Prime Western for early delivery continues firm at 7.25c., St. Louis, or 7.50c., New York, but transactions are not in quantity. Firmness characterizes the situation with many sellers not at all anxious to accept orders. Quotations for future delivery, when at all available, are about 1/2c. per lb. higher per month,

third quarter being held at about 7.37 1/2c. to 7.50c., St. Louis. It seems to be generally accepted that considerable prime Western is being redistilled into Grade A zinc, for which there is a large demand for war purposes. This acts as a strengthening influence on the prime Western market. The Government is also buying and about to buy considerable Grade C. Exports of spelter for April are reported to have been 7290 gross tons.

Antimony.—Dullness prevades the market which is unchanged at 12.25c. to 12.50c., New York, duty paid, for prompt and early delivery. There is a Government inquiry for July delivery on which bids are to go in to-day.

Aluminum.—Maximum prices on No. 1 virgin metal, 98 to 99 per cent pure, have been advanced 1c. per lb. to 33c. for 50-ton and larger lots, 33.10c. for 15 to 50 tons and 33.20c. for 1 to 14 tons. The same schedule is understood to apply to scrap.

Old Metals.—Prices are generally unchanged. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	23.50
Copper, heavy and wire	23.50
Copper, light and bottoms	21.00 to 21.50
Brass, heavy	16.25 to 16.50
Brass, light	12.00 to 12.25
Heavy machine composition	24.50 to 25.00
No. 1 yellow rod brass turnings	13.00 to 13.50
No. 1 red brass or composition turnings	20.50 to 21.00
Lead, heavy	6.50
Lead, tea	5.50
Zinc	5.75

Chicago

JUNE 4.—Tin is salable at almost any price, the difficulty is to get the metal. The apparent demand probably is larger than the real because of the duplication of inquiry, yet there is a steady movement. Because of the abnormally high price and the difficulty of procurement dealings are unsatisfactory, the feeling being that something is wrong. Both lead and spelter are strong though the market is quiet. In antimony, the business done last week was the best in months, but the price is unchanged. The demand for copper continues. Large quantities are being used, especially for Government work and producers are well filled with priority orders. We quote copper at 23.50c. for carloads and 24.67 1/2c. less than carloads; tin, 95c. to \$1.00; lead, 7.15c. to 7.20c.; spelter, 7.25c. to 7.50c.; antimony, 14c. to 15c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 21c.; copper clips, 21c.; copper bottoms, 19c.; red brass, 21c.; yellow brass, 14c.; lead pipe, 5.50c.; zinc, 5c.; pewter, No. 1, 55c.; tinfoil, 65c.; block tin, 70c.

St. Louis

JUNE 3.—The markets were quiet the past week. Lead closed firm to-day at 7c. for chemical, carload lots, while soft Missouri brought 6.90c. Spelter was quiet at 7.25c. In less than carloads the quotations were: Lead, 7.50c.; spelter, 8c.; tin, \$1.25, with none available; copper, 25.12 1/2c.; Asiatic antimony, 15c. In the Joplin district top grade ore was sold at \$75 per ton, with second grades ranging down to \$45, the week's average, basis 60 per cent, being \$57.50. Calamine, basis of 40 per cent, sold at \$30 to \$34 per ton with the average for the week \$32. Lead was steady at \$85 per ton, basis 80 per cent, with the week's average \$84. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 10c.; heavy yellow brass, 14c.; heavy red brass and light copper, 19.50c.; heavy copper and copper wire, 20c.; tinfoil, 55c.; pewter, 25c.; lead, 5.50c.; tea lead, 5c.; zinc, 5c.

The Dominion Steel Corporation, Sydney, N. S., is making many improvements and extensions to its plant. Plans are being completed for the erection of a ship plate mill to have an annual capacity of 100,000 tons, in accordance with its contract with the Canadian Government. A new coke plant is being installed comprising two batteries of 60-by-product ovens each. They are of the Koppers type, 11.3 tons each with a total guaranteed output of 1320 tons per day, on 16 hours' coke time.

NEW TRADE PUBLICATIONS

Cableway Carriages.—Blaw-Knox Co., Farmers Bank Building, Pittsburgh. Folder. Illustrates and describes an automatic single-rope cableway carriage in which only a single hoisting rope and one operator are required to load the bucket, hoist it to the overhead cable, convey it to the opposite end of the system, discharge the load and return the bucket to the starting place. Several views of the carriage in use are given.

Drilling Machines.—Henry & Wright Mfg. Co., Hartford, Conn. Catalog. Points out the advantages of the company's line of drilling machines which are equipped with patent devices for shifting and varying the tension of the belt, a special arrangement for changing the latter when the speed is varied and the incorporation of a new spindle driving mechanism. The different machines are grouped according to classes with illustrations of the different machines in each group and condensed specification tables. A chart of speeds and feeds for drilling is presented and an illustrated list of the parts of the different machines is included for convenience in ordering repairs.

Copper Castings.—Titanium Bronze Co., Inc., Niagara Falls, N. Y. Pamphlet. Illustrations and descriptive matter explain the facilities possessed by this company for turning out high conductivity copper castings in which the impurities do not exceed 0.3 per cent, and electrical conductivity ranges from 75 to 93 per cent, depending on the design. A number of tables of useful information are included.

Motor-Driven Pumps.—Electric Machinery Co., Minneapolis, Minn. Bulletin No. 183. Mentions the work which the synchronous motor is doing in the pumping field, and outlines the general subject of centrifugal pump development. The design and construction of the pump and motors is gone into at some length, the text being supplemented by numerous illustrations and charts. Considerable useful information regarding the handling of water by pumps is presented, and a tabulation of the types of plants employing synchronous motors and the machines driven is included.

Pressure Governor.—General Electric Co., Schenectady, N. Y. Leaflet No. 68,411. Illustrations and descriptive matter explain the operation of a pressure governor for use in the control circuit of any standard self-starter for alternating or direct current motors to maintain a constant pressure between predetermined limits on any liquid or gas system. The different features of the governor are indicated by a series of panels surrounding the illustrations with leaders running to the parts indicated. A condensed specification table and connection diagrams are included.

Brass Spelter Solder.—American Brass Co., Waterbury Brass Branch, Waterbury, Conn. Booklet. Presents illustrations and brief descriptions of different grades of brass spelter solder for brazing purposes. The uses to which this material is put are briefly mentioned and instructions for mixing the solder are included.

Hydraulic Valves and Fittings.—Hydraulic Press Mfg. Co., Mount Gilead, Ohio. Catalog No. 43. Describes a line of hydraulic valves which includes the operating, check, knock-out and safety styles. Accumulator controls, pressure gages, hydraulic pipes, standard fittings, etc., are also listed. Single pages are, as a rule, given to each particular valve, and in a number of cases condensed specification tables supplement the illustration and descriptive matter.

Elevating Industrial Trucks.—Steubing Truck Co., Cincinnati. Pamphlet. Size, 7 1/4 x 9 1/4 in.; pages, 31. Covers the use of industrial trucks of the lift type for interior haulage in factories. For the most part, the illustrations are of actual installations and brief statements of the work that is being done and its cost supplement the engravings. Views of the different types of trucks that can be supplied are presented with condensed tables of specifications and a series of sketches showing the various platforms that can be used.

Centrifugal Pumps.—Wheeler Condenser & Engineering Co., Carteret, N. J. Bulletin No. 108-B. Gives illustrations and descriptions of a line of vertical and horizontal shaft centrifugal pumps, which include units intended for driving from a steam turbine through a reduction gear, motor-driven bi and tri-rotor types and special slow speed engine-driven pumps. Curves of tests run by the builder and the purchaser are included in some cases, and a number of views of installations are presented.

Oil Cooler.—Griscom-Russell Co., 90 West Street, New York. Bulletin No. 901. Treats of an apparatus for cooling the lubricating oil employed in turbine bearings, reduction gears, etc., and that used for heat-treatment quenching sys-

tems. The cooler consists of a cylindrical iron shell surrounding a removable bundle of seamless copper tubes and a helical baffle which is relied upon to give a maximum length of oil path for a given amount of cooling surface and length of shell. The description of the cooler which was illustrated in THE IRON AGE, Oct. 25, 1917, is supplemented by a number of illustrations, and a condensed table of specifications for the different sizes that can be supplied is included.

Electric Welding Machines.—Wilson Welder & Metals Co., Inc., 52 Vanderbilt Avenue, New York. Manual of instructions No. 1. Relates to the use of a special system of electric welding in which a number of operators can work from one large machine without interfering with each other. Complete instructions for the installation and operation of the equipment are given, the text being supplemented by numerous illustrations of the machines and wiring diagrams. Tables giving the carrying capacities of various sizes of wires are presented, together with a series of drawings showing typical examples of work that has been done. Considerable data on the chemistry and fusing points of different metals and a number of tables of useful information are included.

Iron Cements.—Smooth-On Mfg. Co., 570 Communipaw Avenue, Jersey City, N. J. Instruction book No. 16. Treats of a line of cements for repairing iron and steel articles of all kinds. Brief descriptions of each cement are presented followed by directions for mixing and applying, and in a number of cases illustrations of typical repairs made by the company's products are included.

Industrial Lighting.—Cooper Hewitt Electric Co., Hoboken, N. J. Calendar measuring 12 1/2 x 18 1/4 in. The upper half of each leaf contains an illustration of an industrial establishment in which the company's lamps furnished the illumination. These include an ordnance factory, the assembling departments of machine tool plants, grinding and tool rooms, etc.

Gear Shaping Machine.—Fellows Gear Shaper Co., Springfield, Vt. Booklet entitled "The Involute Gear." The booklet, which is now in its third edition, is a simple explanation of the action of involute gearing without employing higher mathematics. The advantages of involute gears and the way in which they are generated are described. The methods of drawing involute tooth curves are explained and definitions and tables of gear tooth parts and terms are included.

Metal Working Machine Tools and Accessories.—Ready Tool Co., Bridgeport, Conn. Catalog No. 16. Refers to a line of chrome-nickel tools for lathes and shaping and planing machines, holders for lathe and boring machine tools, lathe and milling and grinding machine dogs, high-speed steel cutters and other forms of tools for use in metal working machines. Each tool is given a single page with an illustration, brief description and table of the different sizes that can be supplied.

Elevator Door Hardware.—Richards-Wilcox Mfg. Co., Aurora, Ill. Catalog No. A-21. Size, 8 1/2 x 11 in.; pages, 24. Covers in full detail the construction and use of hangers for different types of elevator doors, swing door checks and other appliances for use in connection with elevator doors and various arrangements for closing entrances. A form of construction which has only one opening and that at the underside is emphasized as a solution of the problem of excluding dust and grit from entering the bearings of the hangers.

Portable Acetylene Lights.—Alexander Milburn Co., 1418 West Baltimore Street, Baltimore. Catalog No. 24. Describes and illustrates a line of portable acetylene lights for use at night or in places where artificial illumination is required. In addition to the various lights, several types of torches and generating plants are described. A number of views of the lights in use together with complete instructions for their operation are included.

Chains and Wire Products.—Bridgeport Chain Co., Bridgeport, Conn. Catalog No. 13. Refers to a line of chains of the wire and stamped link types. There is practically no text in the catalog, illustrations and condensed size tables being used almost exclusively. Special wire shapes, hooks, rings, springs, etc., are also illustrated. A complete index and a number of tables of useful information are included.

Elevating Industrial Trucks.—Lewis-Shepard Co., 44 Binford Street, Boston. Catalog. Size, 9 x 11 1/4 in.; pages, 32. Gives general description and specifications for a line of elevating platform industrial trucks, in which the load is raised by the operation of the handle. A universal joint is provided and enables the handle to be swiveled in all directions and the load to be raised irrespective of whether the handle is in the front of the truck or at either side. A number of views of the truck in use in various plants are included. One of the special features of the catalog is that it is of the proper size to be filed in a standard vertical correspondence file and is provided with an index tab on the cover.

PERSONAL

M. C. Turpin, whose entrance into the Federal service as assistant to the manager of the technical publicity bureau of the Ordnance Department, which was noted in the issue of May 30, is the subject of the accompanying portrait engraving. It is from him that information will come of interest to manufacturers. He has been identified for about nine years with the publicity department of the Westinghouse companies.



M. C. TURPIN

Fritz J. Frank was elected vice-president and George H. Griffiths, secretary, of the Iron Age Publishing Co. at a recent meeting of the board of directors. W. W. Macon, managing editor of THE IRON AGE, and C. S. Baur, advertising manager, are newly elected directors of the company.

F. H. Tackaberry of the American Steel Export Co. was scheduled to leave New York on Wednesday, June 5, for a tour of Brazil, Argentine Republic and Chile. He will be accompanied by John D. Snowden, who is accompanied by his family, and is to establish a branch office of the American Steel Export Co. in Brazil.

The honorary degree of master of arts has been conferred upon W. A. Viall, Brown & Sharpe Mfg. Co., Providence, R. I., by Brown University.

Walter V. Turner, manager of engineering for the Westinghouse Air Brake Co., Wilmerding, Pa., has been given the degree doctor of engineering by the University of Pittsburgh, in recognition of his services. He is considered one of the foremost pneumatic engineers in the world, and has more than 400 inventions in use on many railroads, one of which is the "K" triple valve. In 1906 his brake was adopted in the New York subway, and congestion was largely relieved. He is the author of "Train Control, Its Development and Effect on Transportation Capacity."

Effective June 1, W. P. Snyder, Sr., retired as president of the Shenango Furnace Co., Pittsburgh, operating three blast furnaces at Sharpsville, Pa., and became chairman of the company. His son, W. P. Snyder, Jr., was elected president. The other officers are C. D. Dyer, vice-president; George L. Collard, vice-president and general manager; H. M. Wilson, secretary; and Henry Irwin, Jr., treasurer.

H. G. Spilsbury, metallurgical engineer for the Metal & Thermit Corporation, in charge of the alloy sales in the Pittsburgh district, has moved to New York, and will have headquarters in the home office of this company, located in the Equitable building.

H. G. Benedict has become works manager of the Steel Products Co., Cleveland, having severed his connection with the Glenn L. Martin Co., Cleveland, an affiliated company, with which he has been associated in a similar capacity. The Steel Products Co. is now engaged largely in the manufacture of airplane-engine parts.

Lloyd H. Atkinson has resigned as president of Atkinson & Utech, Inc., dealers in railroad supplies, New York, to accept the position of vice-president of the Air Reduction Co., but will continue to serve on the board of directors of Atkinson & Utech, Inc. John

J. Utech was elected president of the company and I. W. Glasel secretary and treasurer.

James A. Campbell, president of the Youngstown Sheet & Tube Co., Youngstown, is a member of the committee in charge of camp welfare houses at Camp Sherman, Ohio. George M. Verity, president of the American Rolling Mill Co., Middletown, Ohio, is president of the committee.

Charles A. McCune has resigned his position as chief engineer of the Commercial Acetylene Co. to become sales engineer with the Page Steel & Wire Co., 30 Church Street, New York, in connection with the sale of welding rods.

Newlin T. Booth, assistant superintendent of the steel foundry department of the Steelton, Pa., plant of the Bethlehem Steel Corporation for a month, was appointed superintendent, effective June 1. Mr. Booth succeeds Bent L. Weaver, who resigned to accept a position as head of the Vulcan Iron Works, Wilkes-Barre, Pa.

Stephen C. Mason, secretary of the McConway & Torley Co., Pittsburgh, recently elected president of the National Association of Manufacturers, has been devoted throughout his business career to railroad work. For several years he was connected with the Interstate Commerce Commission. In 1896 he accepted a position with the McConway & Torley Co., Pittsburgh, and has been in its service continuously ever since. Mr. Mason has taken an active part in all public affairs affecting the interests of the railroads. He is vice-president of the Steel Founders' Society of America, a member of the National Industrial Conference Board, representing the National Association of Manufacturers.

Frank Wollaeger, Jr., secretary Kempsmith Mfg. Co., Milwaukee, manufacturer of milling machines, has been transferred from Base Hospital No. 22, a Milwaukee unit, to the Ordnance Department of the army, and is now at Camp Hancock, Ga., for training.

James H. Hay, superintendent Wallis Tractor Co., Racine, Wis., has resigned to accept the position of works manager of the Lavine Gear Co., Racine.

E. J. Burnes, formerly with Alley & Page, New York, is now connected with the sales department of the Matlack Coal & Iron Corporation, 52 Vanderbilt Avenue, New York.

A. O. Sonne, who for 18 years has been connected with the Chicago office of Rogers, Brown & Co., McCormick Building, has been appointed resident manager of the firm to succeed the late E. L. Billingslea. Mr. Sonne has an intimate knowledge of the field and of the products his company handles.

Charles E. Carpenter, president Allied Machinery Co. de France, will enter the United States Army about June 15 as captain in the Quartermaster Department. He has been devoting himself for several months in France to this service and has decided to give up his entire time.

R. J. Sheridan has been made New York sales manager of the Parkesburg Iron Co., succeeding J. A. Kinkead who is removing to California. Mr. Kinkead will represent the company in San Francisco after July 1. Effective June 1, the appointment of G. W. Denyven as Boston sales manager is announced.

Lieut. T. N. Chambers, president Chambers Engineering Co., Ltd., London, is in New York on his way to South America. The Chambers Engineering Co. has an established machinery trade in Chile, Peru and Bolivia and Lieutenant Chambers's present trip will take in the principal cities of those countries. While in New York he has been in contact with a number of machinery exporting houses interested in South American trade.

Albert Ladd Colby, Bethlehem, Pa., has been taking up with the manufacturers of steel in this country some questions relating to the specifications for airplane steel. While in London some weeks ago Mr. Colby had extended conferences with the committee which prepared the British specifications for airplane steel and the effort is now being made to secure uniformity in these specifications in the two countries.

Pittsburgh and Nearby Districts

The Kennedy Refractories Co., Union Arcade Building, Pittsburgh, operating a plant at Barnbridge, Pa., and Bettsville, Ohio, making Kendyma, used for basic lining in open hearth crucible steel furnaces, has decided to build another plant at Landisville, Pa., work on which has been started.

G. Marshall Everson, Granite Building, Pittsburgh, son of the late T. B. Everson, has taken over the business of his father, engaging in the buying and selling of rolling mill and steel works equipment. Until recently Mr. Everson was assistant manager of the steel works of Henry Disston & Sons, Inc., Philadelphia.

The offices of the Steel Foundries Society of America have been removed to room 511 Magee Building, Pittsburgh.

The National Transit, Pump & Machine Co., Oil City, Pa., states the recent large increase in its capital stock was due to the need for more capital to handle its increase in business. The company does not have any plans at present for enlargement of its plants. Its products consist of gas and oil engines, pump machinery, pipe line fittings and supplies, and milling machines.

The Pittsburgh Iron Folding Bed Co., recently purchased a plot of land on Pike Street, that city, on which it proposes to build a new factory to cost about \$110,000.

The Woodruff Coal & Iron Co., Pittsburgh, recently moved into larger quarters in the Oliver Building. It has taken the business of the Fobewood Coal & Iron Co. W. W. Woodruff is president. The company handles, coal, pig iron, coke, castings and various steel products.

The Mahoning & Shenango Railway & Light Co., of Youngstown, Ohio, has applied to the Public Utilities Commission of Ohio, for authority to issue \$600,000 bonds to be sold at 90 and \$200,000 7 per cent preferred stock. The Interstate Commerce Commission has approved the application.

General inquiry for machine tools in the Pittsburgh district has been only fairly active for some time, but it is believed will be a good deal heavier in the near future. Very few additions are being made to existing manufacturing plants, and very little new construction is under way. Most of the demand for machine tools is coming from the Government to concerns that are doing Government work, and the outlook is that a very large amount of new equipment in the way of heavy machine tools will come out in this market before long. No lists have yet appeared for the tools for the new gun and projectile plant on Neville Island to be built for the Government by the United States Steel Corporation, and it may be some time before the lists are ready. Some heavy hydraulic presses will be installed in the Neville Island plant, the largest of these to have a maximum pressure of 15,000 tons. It is said the Bethlehem Steel Co., Bethlehem, Pa., is the only concern in the country equipped to build hydraulic presses of such large capacity, and the contract for these larger presses will likely go to that corporation. There are several companies in the Pittsburgh district equipped to build hydraulic forging presses up to 6000 tons pressure, and it is probable orders for some of the smaller hydraulic presses will be placed with them.

The inquiry for cranes in the Pittsburgh district is active. The Baltimore & Ohio Railroad has placed a contract with Westinghouse Church Kerr & Co. of New York for the building of a very large machine shop in its Glenwood yards, near Pittsburgh. The main machine shop building is to be 150-ft. by about 600-ft., and its total cost with equipment is given as \$1,750,000. A very large quantity of new equipment in machine tools, cranes and other machinery for the new plant will be needed, and the lists are expected to come out in a short time. The inquiry for the cranes for the new shop has already appeared and calls for two 100-ton, one-30, three-15, and four 3-ton cranes. The Re-

public Chemical Co. recently placed a contract for a 10-ton crane for an extension it is building to its plant on Neville Island, Pittsburgh.

J. W. Cruikshank, consulting engineer, Hartje Building, Pittsburgh, has received a contract for material extensions to the machine shop of the Fawcett Machine Co., Ford City, Pa. The present machine shop is to be moved in order to allow an addition, 76 x 102-ft. to be made to it. A new pattern shop is also to be built, 50 x 100-ft. No new tools will be needed for the addition to the machine shop at present, but some will likely be wanted for the pattern shop.

A community chorus with 50 voices has been organized in the Westinghouse Electric & Mfg. Co.'s plant at East Pittsburgh, under the direction of a noted tenor and concerts are now being given at noon every day throughout the entire works. Recently a number of employees formed a mixed chorus to sing national and old folk songs. The project was so pleasing and cheering to the workers that it was decided to form a permanent organization.

The Pennsylvania Engineering Works, New Castle, Pa., has received a contract for the rebuilding of No. 3 furnace of the Carnegie Steel Co., Farrell, Pa. The furnace will be completely overhauled, and a considerable amount of new equipment added, and the output is expected to be increased from 350 to 500 tons per day. After No. 3 furnace has been finished and put in blast, No. 2 stack at Farrell will be put out for relining and will be rebuilt.

The 10 cents per ton reduction made in price of soft coal that went into effect on May 27 makes the price of coal in the Pittsburgh district as follows: Slack \$2.10; mine-run \$2.35; screened \$2.60 per net ton at mine. The prices apply on new sales as well as on deliveries against old contracts, except in the case of some long term contracts that do not come under the price fixing. All the regular annual contracts, starting April 1, were required to be at not above the set prices at time of shipment.

The annual conference of wage committees of the Amalgamated Association and the Western Bar Iron Association for the purpose of fixing up the Amalgamated scales for bar iron mills for the year starting July 1 will be held at Atlantic City, N. J., starting June 24. The meeting of the wage committees of the sheet and tin plate scales will be held at Atlantic City, N. J., starting June 17. No important changes in any of the Amalgamated wage scales are recommended in the new scales to be presented to the manufacturers for their signatures, so that it is expected the scales will be very quickly agreed upon and signed. Some changes in footnotes on both the sheet and tin mill scales will be recommended, but these are not important. The sheet and tin mill hands realize that the present scales have worked out very satisfactorily, and they are willing to have them continue for another year.

The Heppenstall Forge & Knife Co., Pittsburgh, is making some additions to its plant. The company is working largely on war materials for the Government.

The Pittsburgh Truck Wheel Corporation, Pittsburgh, has been organized by A. L. Schultz, Robert W. Barbour and others. The company is capitalized at \$4,000,000 and proposes to build a plant in the Pittsburgh district for the manufacture of steel truck wheels.

The Graselli Powder Co. is making large additions to its powder plant near New Castle, Pa. The company reports a great shortage in employees and is in urgent need of 300 men or more, but is finding great trouble in getting them.

The quota of Vandergrift, Pa., in the recent Red Cross campaign was \$5,000, but the total amount subscribed was \$36,042.11. The open hearth steel works and sheet mills of the American Sheet & Tin Plate Co. are located at Vandergrift and also the Vandergrift plant of the United Engineering & Foundry Co., which makes steel castings.

Molders in the Pittsburgh district have asked for an

increase in wages from \$5.25 to \$6.00 per day, effective from June 1, and a day of 8 hours. The demands of the men have not been granted, and molders employed in 30 or more foundries have gone out. It is said nearly 1000 men are affected.

The Colonial Supply Co., dealer in mill, mine and contractors' supplies, Pittsburgh, Pa., has removed to larger quarters at 217 Water Street, occupying an entire block.

Book Reviews

Aviation Engines. By Victor W. Pagé. Pages 576, 5 1/4 x 8 1/2 in.; illustrations, 253. Published by the Norman W. Henley Publishing Co., 2 West Forty-fifth Street, New York. Price, \$3 net.

The book, which was written primarily for instruction purposes for men in the aviation section of the Signal Corps, and students who wish to become aviators or aviation mechanicians, is not of a technical character, but a work of reference. The latest rotary types, such as the Gnome Monosoupape and the LeRhone, are fully explained, as well as the V and radial types. Carburetion, ignition, cooling and lubrication are covered, and special attention has been paid to instructions on tool equipment, use of tools, trouble location and engine repairs. Only such theoretical consideration of thermodynamics as was deemed absolutely necessary to secure a proper understanding of engine action is included, the author's efforts having been confined to the preparation of a practical series of instruction that would be of the greatest value to those who need a diversified knowledge of internal combustion engine operation and repairs and must acquire it quickly.

Elements of Machine Design. By O. A. Leutwieler. Pages xv + 607, 6 x 9 in.; illustrations, 339. Published by McGraw-Hill Book Co., New York, and for sale by IRON AGE Book Department. Price, \$4.

Patterned closely after Unwin's work with the same title, the above mentioned book might be briefly described as "Unwin up-to-date." And the author, both in his preface, as well as throughout the book, gives due recognition to various standard works, engineering society transactions and technical press records, which have been rather freely consulted. Making due allowance for this, the fact remains that the author's treatment of his various subject matters is unusually practical and should prove valuable as a reference work to those having a good grounding in elementary mechanics.

Presupposing this grounding, the first two chapters are devoted to stresses and strains in machine parts, and materials used in construction of machine parts. These include brief synopses of matters pertaining to the strength of materials, and iron, steel and alloys. Many standard tables are enlarged to include materials having greater use during recent years with the most modern accepted values for them, together with some idea of their chemical content and the method of producing them.

The next three chapters deal with various types of fastening used in mechanical construction, as rivets, screws, bolts and keys. Much of the data set forth in them is presented in a manner so technical as to destroy somewhat its value for quick reference, except for the most advanced students. In places this is accentuated by not arranging facts in their logical sequence.

Then, interposed between three chapters on belting pulleys and manila and wire rope transmission, which set forth complete and up-to-date information in a manner not open to the foregoing criticism, is a very interesting one on cylinders, plates and springs. A part of this chapter dealing with automobile springs gives, concretely, data on this subject not ordinarily easily found except by consulting several sources. In the part given to standard spring formulas, it seems unfortunate that the author has neglected describing graphic and slide rule adaptations of the formulæ.

Next come chapters on chains and sprockets, friction, spur, bevel and screw gearing. The one describing

chains and sprockets is extremely complete, even though a trifle conservative in some of its recommendations. The one on friction gearing is inclined to be theoretical, while those on spur, bevel and screw gearing simply condense, in a commendable manner, standard treatises on the subject. Perhaps the only real criticism of them is that they have not more fully covered the practical manufacture of gearing in its various phases.

Following these chapters come ones dealing with couplings, friction clutches and brakes. Each of these covers its subject well. Particularly the one describing friction clutches, in which practically every type of clutch is dealt with and its various merits discussed. Adaptations and modifications used in automobile practice are shown by detailed illustrations based on drawings furnished by the manufacturer.

The concluding chapters cover shafting, journals, bearings and lubrication and bearings with rolling contact. These chapters are complete, particularly the last one, which describes the various makes and applications of both roller and ball bearings. E. C. R.

The Taylor Instrument Companies, Rochester, N. Y., have issued a collection of authoritative tables and data relating to the testing of oils and general refinery practice. Over 30 tables, the majority of which have been taken from circulars of the Bureau of Standards, are included and cover temperature corrections for gravity readings, corresponding gravity and weight, and similar testing data, also for steam and refrigerating plant operation and the conversion of weights, measures and moneys, etc. When necessary explanations of the tables and their use are presented. Illustrations of apparatus which the company can supply for the testing of oils and a comprehensive index are included. The price of the book is \$1.

"Poor's Manual of Industrials for 1918" has just come from the press, being published two months earlier in the year than the volume for 1917. The general information is revised to April 18. With 2736 pages the book is the largest of its kind. For all industrial companies in which there is public interest the latest income accounts and balance sheets are given, with comparative figures for other years in most cases. Complete information is given for the first time in the pages of the book concerning the income taxes on industrial securities. It is indicated whether the companies assume 4 per cent tax or a 2 per cent tax or no tax. The publisher is Poor's Manual Co., 80 Lafayette Street, New York, and the price is \$10 a copy.

"The Salem Iron Factory" is the title of a pamphlet dealing with early iron manufacturing in Essex County, Mass. The author is Francis B. C. Bradlee, of Marblehead, Mass. The first iron works in the United States that existed long enough to take a permanent place in the history of the industry were established at Lynn, Mass., in 1643 and the first iron pot made in New England was cast in that foundry in the same year. The author follows the developments from that time in an interesting narration. The pamphlet is published by the Essex Institute, Salem, Mass., and the price is \$1.

A 200-page book on the storage of bituminous coal has been prepared by the Engineering Experiment Station, University of Illinois, Urbana, Ill. The reasons and advantages of storing coal are given, the kinds and sizes of coal which may be safely stored are described, and the factors entering into successful storage are discussed. The price is 40 cents per copy.

"Mining and Concentration of Carnotite Ores" by Karl L. Kithil and John A. Davis, is the title of Bulletin 103 of the U. S. Bureau of Mines. The Carnotite ores of Colorado and Utah are discussed as a source of radium primarily, but also of vanadium and uranium.

"Oil and Gas Possibilities in the Belton Area" by Malcolm E. Wilson is the title of a pamphlet issued by the Missouri Bureau of Geology and Mines, Rolla, Mo. It discusses the oil and gas resources of northern and western Missouri.

Machinery Markets and News of the Works

SHIPBUILDING EXPANSION

Enlargement of Yards and Turbine Plants

Large Tool Orders Expected Soon from New Ordnance Contracts

Expansion of American shipbuilding facilities, under the direction of Charles M. Schwab, will furnish a great deal of business for builders of fabricating machinery and large machine tools and crane builders. This expansion is in three directions: Enlargement of existing shipyards, new facilities for making ship-propelling machinery and new fabricating shops.

The New York Shipbuilding Corporation, Camden, N. J., is in the market for complete equipment for new shops, and its buying will probably total more than \$1,000,000 for machine tools alone. The Sun Shipbuilding Co., Chester, Pa., has issued a small list, but it is understood that its requirements will be larger if plans for expansion are approved. The Carolina Shipbuilding Co., New York, has closed for considerable equipment for its new yard at Wilmington, N. C. The Traylor Shipbuilding Corporation, Cornwells, Pa., now engaged in building wood ships, may engage in steel shipbuilding. Shipyards on the Great Lakes have taken locomotive and traveling cranes, fabricating machines and machine tools in large volume for the doubling of their ship output. Mr. Schwab is said to be seeking for every possible opportunity for the enlargement of present shipbuilding facilities, but at least two new large yards will be constructed by a prominent shipbuilding corporation, as reported last week. Quotations have been received by this corporation for more than 200 traveling and locomotive cranes. Fabricating machinery has also been inquired for, and inquiries for machine tools will follow, as each shipyard will have its own shops for building all ship parts.

The Newport News Shipbuilding & Dry Dock Co., Newport News, Va., will build a new plant at Richmond, Va., for turbines, boilers and auxiliary ship-propelling equipment. A large list of cranes and tools has been sent out. Mr. Schwab has also announced that the turbine plant of the Westinghouse Electric & Mfg. Co., Lester, Pa., will be enlarged about 40 per cent. The American Steel & Forge Corporation, Widener Building, Philadelphia, may establish a new plant for making crank shafts and other large forgings for ships. Quotations have been received on a list of machine tools.

Inquiry for locomotive cranes is very large. Cleveland builders report that one Eastern shipyard wants 35 and another 28. The Chickasaw Shipbuilding Co., Chickasaw, Ala., wants 15 to 18 cranes of special type.

Pacific Northwest shipyards are expanding. The Skinner & Eddy Corporation, Seattle, Wash., is buying new equipment. It will expend \$2,000,000 for a ship repair plant and dry docks. The Hewitt Dry Dock & Shipbuilding Co., Tacoma, Wash., will build a plant

with 20 shipways for building steel ships. The Northwest Steel Co., Portland, Ore., will add four shipways to its present plant on the Willamette River. The Todd Shipbuilding Co., Tacoma, Wash., will make extensions costing about \$1,000,000. Other shipyards are being projected.

Expansion of fabrication facilities will include one or two new fabricating shops to be built by the Mc-Clintic-Marshall Co., Pottstown, Pa. One of the shops, possibly both, will be located at Pottstown. Some of the equipment has been bought in Cleveland.

More may be heard soon of new gun plants. It is reported that a plant for making 6-in. guns and shells may be built in northern New York State by a company now successfully engaged in making guns of smaller size. The new plant will include forging facilities and a machine shop.

It is reported from New England that machine-tool builders in that territory are expecting large orders soon as the result of placing of ordnance contracts. The New Home Sewing Machine Co., Orange, Mass., has received a shell contract. The Crucible Steel Co. of America, Harrison, N. J., is seeking boring lathes for work on shells. The Grant Motor Corporation, Cleveland, has bought tools for its Findlay, Ohio, plant for shell manufacture. The Peninsular Shell Co., Saginaw, Mich., has secured an additional contract for 1,000,000 trench mortar shells.

The Chicago machinery trade expects a larger proportion of war business to come to that territory. The L. Wolff Mfg. Co., Chicago, has bought equipment for making 155 mm. shells and the International Harvester Co. has purchased 40 lathes and a number of drilling machines for work on rifle grenades. David A. Wright, machine-tool builder, Chicago, is equipping his plant for the manufacture of large lathes.

The machine-tool trade is looking for heavy buying by the railroads.

It is intimated in some quarters that the Government may license machine-tool dealers. Nothing official has been announced to confirm this report.

New York

NEW YORK, JUNE 4.

Expansion of shipbuilding facilities, including the manufacture of ship-propelling machinery, continues the dominating factor in demand for metal-working machinery and cranes. The two new shipyards which will be built for the Emergency Fleet Corporation, as reported here last week, will be constructed and operated by a large shipbuilding corporation. Quotations on more than 200 traveling and locomotive cranes have been received the past week and orders for the locomotive cranes may be placed this week. As previously announced, one of the yards will be on the Pacific, probably near San Francisco, and the other at some point on the Atlantic coast. The list of traveling cranes for each shipyard presented to crane builders numbered 96, of which more than 30 were of special type, one being a 150-ton-hammerhead crane. The standard bridge cranes were specified as follows: Nine 10-ton, double trolley, 70-ft. span; six 5-ton, double trolley, 50-ft. span; ten 10-ton, double trolley, 50-ft. span; eight 10-ton, double trolley, 96-ft. span; ten 5-ton, double trolley, 50-ft. span; one 50-ton, with 5-ton auxiliary, 75-ft. span; three 25-ton, with 5-ton auxiliary, 75-ft. span; six 5-ton, 30-ft. span; two 10-ton, 70-ft. span; one 25-ton, with 5-ton

auxiliary, 50-ft. span; two 5-ton, 50-ft. span; two 25-ton, with 5-ton auxiliary, 60-ft. span; two 10-ton, 60-ft. span; one 15-ton, 60-ft. span. These new shipyards will call for the purchase also of large lists of machine tools, fabricating equipment, etc., as complete shops for the manufacture of all ship parts will be provided.

The New York Shipbuilding Corporation, Camden, N. J., has issued a list of machine tools and other equipment for the expansion of its shipyard. Its purchases will total \$1,000,000 or more. Many large tools are being inquired for. The Sun Shipbuilding Co., Chester, Pa., has issued a small list of tools, but may buy considerable equipment if plans for the expansion of this yard receive official approval, as they probably will.

Charles M. Schwab, director general Emergency Fleet Corporation, has announced that the turbine-manufacturing facilities of the country will be greatly expanded. The Newport News Shipbuilding & Dry Dock Co., Newport News, Va., has issued a very large list of equipment it will buy for a plant at Richmond, Va., which will make ship-propelling equipment. Mr. Schwab announces plans for a 40 per cent enlargement of the Westinghouse Electric & Mfg. Co.'s turbine plant at Lester, Pa., and new equipment will also be required for this expansion. The General Electric Co. is buying machine tools to speed up its turbine construction.

The Newport News turbine plant and a new boiler shop will require a list of cranes as follows: For welding plant: One 5-ton, 28-ft. span; one 2-ton, 28-ft. span; two 25-ton, 62-ft. span; three 5-ton, 23-ft. span. For boiler shop: Two 70-ton, double trolley, with 10-ton auxiliaries, 62-ft. span; two 20-ton, 62-ft. span; one 10-ton, 62-ft. span; two 10-ton, 23-ft. span. For machine shop: One 70-ton, double trolley, with 10-ton auxiliaries, 62-ft. span; one 35-ton, with 5-ton auxiliaries, 62-ft. span; three 20-ton, 62-ft. span; three 5-ton, 23-ft. span. For foundry: One 35-ton, with 7½-ton auxiliaries, 62-ft. span; three 20-ton, with 5-ton auxiliaries, 62-ft. span; three 5-ton, 23-ft. span.

Crane requirements of the New York Shipbuilding Corporation are as follows: For plate and angle shop: One gantry, with two 10-ton trolleys, 86-ft. span; one gantry, with two 10-ton trolleys, 67-ft. span. For new shipyard: Two gantries, with two 5-ton trolleys, 56-ft. span; one gantry, with two 10-ton trolleys, 52-ft. span; four 15-ton overhead cranes, 68-ft. span, and four of same capacity and span, double trolley; four 20-ton, 42-ft. span; four or six 10-ton, with two 5-ton trolleys each, 88-ft. span; two 15-ton, double trolley, 7½-ton trolley for each. For the machine shop: One 50-ton, 68-ft. span; one 20-ton, 68-ft. span; one 10-ton, 68-ft. span. For freight house: Two 10-ton, 27-ft. span.

The Vulcan Iron Works, Wilkes-Barre, Pa., may close this week on a list of about 10 cranes. The Terry Shipbuilding Corporation has closed with the Milwaukee Electric Crane & Mfg. Co., Milwaukee, for five 10-ton cranes of 50-ft. span for its shipyard at Brunswick, Ga. The Sun Shipbuilding Co., Chester, Pa., has issued a tentative list of its crane requirements, comprising 11 cranes. The Carolina Shipbuilding Co., New York, has closed for considerable shipyard equipment.

A company in New York State, which is now successfully making guns for the army, it is reported, may build another plant for 6-in. guns and shells, possibly near Buffalo. If negotiations are completed it will come into the market soon for forging equipment and tools for machining. The Crucible Steel Co. of America, Harrison, N. J., is looking for tools for work on 6-in. shells, its list including 12 to 15 boring lathes of 20 to 24 in. The New Home Sewing Machine Co., Orange, Mass., has recently received a shell contract and has bought equipment.

The American Steel & Forge Corporation, John M. Larsen, president, has opened offices in the Widener Building, Philadelphia, and is receiving quotations on a large list of machine tools for a new plant it may build for the forging and machining of crankshafts for ships and other similar work. It is understood that the corporation is negotiating with the Emergency Fleet Corporation for a contract.

Buying of machine tools in the New York market is in fair volume, though most of the orders are small. There is great interest in the additional requirements of the Wright-Martin Aircraft Corporation for its newly acquired Long Island City plant. It is reported in the trade that its recent buying, which totaled about \$750,000, will be doubled. The Standard Stoker Co., Grand Central Terminal, New York, has bought more tools in the past week for a plant at Erie, Pa., where it will make mechanical stokers for the new locomotives contracted for by the Railroad Administration. The Singer Sewing Machine Co., New York, has bought tools to round out its equipment for the manufacture of recoil mechanisms for 75-mm. guns.

Shops at work on gages for the Ordnance Department have bought precision tools the past week. There is an in-

creasing demand for great accuracy in Government work, particularly for the Ordnance Department, Signal Corps and the Navy, the Government specifications for accuracy being more stringent than has previously been known in American machine-shop practice.

Machine-tool dealers are disturbed by an order issued by the General Engineer Depot, War Department, which says that purchases will not be made except from manufacturers or dealers having desired tools in stock. As a majority of the recognized distributors of machine tools do not carry tools in stock under present conditions, it would appear as if the tendency of Government departments is to eliminate them entirely on its direct purchases. This particularly affects dealers in Philadelphia or Baltimore, who include Washington as a part of their territory. It is intimated in some quarters that the Government may eventually license machine-tool dealers, as has been done in England for some time past. Dealers who have engaged in profiteering would, by the licensing method, be eliminated.

There has been a 10 per cent advance in the price of shapers.

The Machine Tool Engineering Co., New York, L. S. Love, general manager, has moved from the tenth floor of the Singer Building to room 501.

The Superheater & Engineering Co., Inc., New York, has been incorporated with a capital of \$50,000 by George C. Franciscus, Elmer E. Higbie and Elliot A. Jacobs, 930 St. Johns Avenue.

The United States Concrete Shipbuilding Co., New York, has been incorporated with a capital of \$500,000 by C. S. Rice, S. B. Howard and A. W. Britton, 28 Nassau Street.

The Pressed & Welded Steel Products Co., 66 Myrtle Street, Flushing, L. I., will build a new one-story machine shop, about 75 x 100 ft., at Long Island City.

Fire, May 24, destroyed part of the works of the Tuttle-Bailey Mfg. Co., 79 North Tenth Street, Brooklyn, with loss reported at \$50,000. The company manufactures metal gun caps, and has recently been working on Government contracts.

McWilliams Brothers, Front Street, Long Island City, N. Y., operating a yard for building small ships, will build a one-story brick machine shop, 25 x 75 ft.

The Technical Development Corporation, New York, has been incorporated with a capital of \$100,000 by J. A. Hanway, F. D. Hearn and J. J. McCormack, 71 East Eighty-Sixth Street, to manufacture electrical products.

The Racich Asbestos Mfg. Co., 609 West Fifty-fifth Street, New York, is having plans prepared for a three-story plant, 90 x 115 ft., at Harris Avenue and Hancock Street, Long Island City. Jacob Racich is president.

In connection with the twelve-story building to be erected by the Detroit Cadillac Motor Car Co., 1881 Broadway, New York, at Columbus Avenue and Sixty-second Street, to cost \$600,000, a service and repair works will be installed. Frederick T. Ley & Co., 19 West Forty-fourth Street, are the building contractors.

The Rolled Plate Metal Co., 52 Vanderbilt Avenue, New York, has increased its capital from \$50,000 to \$200,000.

The Ridgeway Steel Products Co., New York, has leased property at 697 West 133d Street for a new works.

The George W. Copp Co., 351 West Fifty-second Street, New York, manufacturer of automobile equipment, has leased a two-story factory to be erected on plot 100 x 100 ft., at Eleventh Avenue and Fifty-fourth Street. It has a Government contract and, it is understood, will equip and use the factory for this production.

The Greenpoint Improvement Co., New York, recently incorporated, has purchased about 800,000 sq. ft. of property, Greenpoint district, Brooklyn, for about \$950,000. It is at the entrance of Newtown Creek, with water frontage of about 1700 ft., and it is said will be used by the new owner as site for a shipbuilding plant.

The De Laval Separator Co., 165 Broadway, New York, manufacturer of cream separators, has awarded contract to the John W. Ferguson Co., United Bank Building, Paterson, N. J., for a one-story addition to its machine shop at Poughkeepsie, N. Y.

William F. Ryerson, Inc., Glen Falls, N. Y., has been incorporated with a capital of \$10,000 by M. T. Rogers, D. E. Barber and William F. Ryerson, to manufacture piston rings, etc.

The Niles-Bement-Pond Co., Plainfield, N. J., manufacturer of machine tools, is building four additions to its plant on South Second Street, to cost about \$400,000. Two of the larger buildings will be one-story, 100 x 180 ft. A large boiler plant for works operation is also being erected.

Sub-bids are being taken for the erection of the new plant of the National Pneumatic Co., 50 Church Street, New

York, at Rahway, N. J., to be of brick and concrete, one and two-story, 200 x 370 ft.

The Mack Machine Co., Atlantic City, N. J., has been incorporated with a capital of \$21,000 by George W. Mack and Eli B. Philpot.

The Standard Underground Cable Co., Perth Amboy, N. J., has completed arrangements for the purchase of 36 acres at Keasbey, Woodbridge Township, for about \$39,000. It is said that the land may be used by the company as a site for a new works.

The Edison Primary Batteries Co., West Orange, N. J., has been incorporated with a capital of \$500,000 as a subsidiary of the Thomas A. Edison, Inc., interests, to manufacture electric batteries, etc. The incorporators are Thomas A. Edison, Charles Edison and Stephen B. Mainbert.

The Crucible Steel Co., Harrison, N. J., has purchased about 19 acres on Cumberland Street, between Fourth and Sixth streets, from the New Jersey Railroad & Canal Co., for about \$90,000, to be reserved for future extensions.

The United States Ammunition Co., New York, has been incorporated in Delaware with a capital of \$2,500,000 by Harry C. Picling, Charles O. Geyer, East Orange, N. J., and Stanley L. Gedney, Maplewood, N. J.

The Carbon Co., Inc., Union Hill, N. J., has been incorporated with a capital of \$100,000 to manufacture incandescent lamps, etc. Edward J. Simon, Myron D. Grove and John T. Simon, Weehawken, are the incorporators. Its works will be located at 208 Blum Street, Union Hill.

The Ordnance Department, Washington, has awarded a contract to the Butterworth-Judson Co., Newark, N. J., for the establishment of a picric acid works at Brunswick, Ga., to cost about \$7,000,000. It is understood that the company will operate the new works for the Government.

The Diamond Tool Co., Newark, N. J., has been incorporated with a capital of \$125,000 by John E. M. Simpson, August Voros, Hilton, and Edwin C. Wickett, East Orange.

Fire destroyed the plant of the Asbestos Casket Co., Lowville, near Utica, N. Y., May 27, with loss estimated at \$75,000.

The Emmadine Machine Corporation, Hopewell Junction, N. Y., has been incorporated with a capital of \$50,000 to manufacture machinery, tools, dies, etc. R. Stuart and H. C. Spratley, Hopewell Junction; and H. M. Wise, 50 Pine Street, New York, are the incorporators.

The Nicholson File Co., 88 East Eleventh Street, Paterson, N. J., with main works at Providence, R. I., has awarded a contract to F. G. Pittet, 126 Market Street, Paterson, for the erection of two one-story additions to its local works, 40 x 450 ft., and 37 x 200 ft., to cost \$75,000.

Arthur C. Mason, Inc., Putnam Street, Paterson, N. J., has filed articles of incorporation with a capital of \$50,000 to manufacture tools and mill supplies.

The Baldor Metal Works, East Orange, N. J., has been incorporated with a capital of \$100,000 by Hyman Bachmann, East Orange; M. Liberman, West Orange; and Louis Dorman, Elizabeth.

The Terminal Transit Co., 1 Broadway, New York, is considering the construction of a shipbuilding plant at Doyer's Point, Newark Bay, Jersey City.

A five-story cooperage plant, 100 x 150 ft., to cost about \$200,000, will be erected by Swift & Co., 154 Ninth Street, Jersey City, at Ninth and Henderson streets. The White Fireproof Construction Co., 286 Fifth Avenue, New York, has the contract.

The new additions to be erected at the plant of the Vulcan Iron Works, foot of Morris Street, Jersey City, at an estimated cost of \$50,000, will be used as forge shops.

The Clothometer Co., New York, has been incorporated with a capital of \$100,000 by O. M. Lazarus, 209 Underhill Avenue, Brooklyn, and F. Bernholz, 626 West 136th Street, New York, to manufacture measuring machines and registers for cloth, etc.

The Greenpoint Iron & Pipe Co., 330 Graham Avenue, Brooklyn, has been incorporated with a capital of \$20,000 by P. and S. Winer and H. Brainum, 1239 St. Johns Place, Brooklyn.

Alexander McDonald, 2855 Richmond Terrace, Mariner's Harbor, West Brighton, S. I., is having plans prepared for a shipyard to cost about \$100,000 adjoining his works, recently acquired. The initial shop building will consist of a one and two-story structure, 40 x 125 ft.

The Village Letter Foundry Co., New York, has been incorporated with a capital of \$25,000 by E. E. Connor, F. W. Goudy and H. Marchbanks, 21 West Eleventh Street, to manufacture type, etc.

Contract has been awarded by the Triplex Safety Glass

Co., 120 Broadway, New York, to Charles Ward Hall, 140 Nassau Street, for the construction of its works at East Mt. Vernon, N. Y., to cost about \$50,000.

The Gotham Can Co., 60 Eagle Street, Brooklyn, has plans for a three-story plant, 60 x 100 ft., at Eagle Street and Franklin Avenue, to cost \$35,000.

The Atlantic Basin Iron Works, Summit Street, Brooklyn, has awarded a contract to William H. Henry, 316 Flatbush Avenue, for the construction of a three-story addition on Van Brunt Street, to cost about \$25,000.

The Tergesen-Hansen Co., Inc., Brooklyn, has been incorporated with a capital of \$40,000 to manufacture motor boats and other craft. M. Tergesen, 973 Seventy-fifth Street; C. Hansen, 969 Seventy-fifth Street, and K. Hansen, 212 Clinton Street, are the incorporators.

The Technical Development Corporation, New York, has been incorporated with a capital of \$100,000 by J. A. Hanway, F. D. Hearn and W. G. Chittick, 32 Broadway, to manufacture electrical equipment.

The W. F. Meyers Machine Co., Hamilton Street, Long Island City, N. Y., has plans for a one-story brick addition, 50 x 75 ft., to cost \$10,000.

The Meurer Steel Barrel Co., 575 Flushing Avenue, Brooklyn, has filed plans for a one-story building, 100 x 200 ft., at its Long Island City plant, Third and Oliver streets, to cost \$20,000.

The Bridgeport Tube Works, 50 Church Street, New York, has filed articles of incorporation with a capital of \$400,000 by A. S. Neuburger, J. L. T. Waltz and J. H. Eatsterday.

The Hauck Mfg. Co., 113 Eleventh Street, Brooklyn, manufacturer of oil burners, has completed plans for a three-story brick addition, 75 x 100 ft., to cost \$25,000.

The Multi-Metal Co., New York, has been incorporated with a capital of \$150,000 to manufacture steel screens, wire cloth, etc. E. M. Mueller, S. Dannenberg and L. Scheuer, 87 Nassau Street, are the incorporators.

The Roduro Furnace Co., New York, has been incorporated with a capital of \$500,000 to manufacture furnaces, etc. R. A. Rosander, T. H. Ross and A. T. Brice, 157 Court Street, Brooklyn, are the incorporators.

The Lidgerwood Mfg. Co., 326 Frelinghuysen Avenue, Newark, manufacturer of hoisting machinery, will build a one-story addition to its pattern works, 30 x 100 ft.

The F. & L. Mfg. Co., 2 Central Avenue, West Orange, N. J., has filed notice of organization to manufacture metal ash sifters, etc. M. Lieberman heads the company.

The Abrasives Metal Corporation, Newark, has leased a factory at 325-27 Ferry Street, for a new plant.

The State Hospital Commission, Capitol, Albany, is receiving bids for new boilers and heating work for new central heating and lighting plant at the Central Islip State Hospital, Central Islip, N. Y.

Buffalo

BUFFALO, June 3.

The Burke Electric Co., Erie Pa., has completed the purchase of a 25-acre factory site at Conneautville, Pa., on the Bessemer & Lake Erie Railroad, where it will erect a branch plant for the manufacture of electrical apparatus to be completed early next fall.

The Acme Steel & Malleable Iron Works, 245 Military Road, Buffalo, has increased its capital from \$400,000 to \$600,000. The company recently filed plans for a one-story addition, 100 x 175 ft.

The American Locomotive Co., Dunkirk, N. Y., is planning a one-story addition to its works, 85 x 120 ft.

The Hammond Steel Co., Solvay, N. Y., has broken ground for a two-story addition, 35 x 45 ft.

The Waverly Machine & Tool Corporation, Waverly, N. Y., has been incorporated with a capital of \$10,000 by G. W. Weed, A. H. Roberts and C. W. Canoll, Waverly, to manufacture machinery and tools.

The Precision Die Casting Co., Fayetteville, N. Y., has drawn plans for an addition, 60 x 90 ft.

The U. S. Lens Co., Geneva, N. Y., will build a factory extension, 102 x 189 ft., one story, to cost approximately \$50,000. A. T. Wilson is president.

The Douglas Packing Co., Fairport, N. Y., will build a power house, 50 x 76 ft., one story.

The Gould Storage Battery Co., Depew, N. Y., is drawing plans for a two-story addition, 90 x 75 ft.

The Cochran-Bly Co., manufacturer of machinery, Rochester, will erect an addition, 48 x 70 ft., to its plant on St. James Street.

New England

BOSTON, June 3.

Now that it is definitely known that New England has been placed in an industrial barred zone by the Fuel Administration, there is a prospect that plant extensions will be few for some months to come. It is understood that all projects calling for extensions will be carefully scrutinized by the Fuel Administration because of the expected difficulty in increasing the coal supply for this section. Necessary extensions for essential war work will probably be made but industries not engaged on essentials will find it difficult to obtain permits for new plants and additions.

The flow of business to the machine-tool builders is unchanged from the previous weeks. A good business is being done but large orders are scarce. Most manufacturers of machines and tools are getting their organizations in readiness for a rush of business that is expected to follow the placing of big ordnance orders.

The Malleable Iron Fittings Co., Branford, Conn., has awarded to the H. Wales Lines Co., Meriden, a contract for a foundry, 135 x 200 ft., one story.

The Housatonic Machine Co., Bridgeport, Conn., has given to the Marsh Brothers Co. a contract for an addition, 40 x 44 ft., one story.

The Bemis & Call Hardware & Tool Co., Springfield, Mass., is to build an addition, 34 x 60 ft., one story.

The C. G. Garrigus Machine Co., Bristol, Conn., has changed its name to the Bristol Machine Tool Co.

The Bullard Machine Tool Co., Bridgeport, Conn., has awarded to John R. Sheehan a contract for a foundry addition, 40 x 70 ft., two stories.

The Liberty Screw Co., Worcester, Mass., has awarded to the E. J. Cross Co. a contract for a factory, 60 x 150 ft., one story, to be built on Shrewsbury Street. A. J. Booth is president.

The Harwood & Quincy Machine Co., Worcester, Mass., has given a contract to E. D. Ward for a one-story addition.

A new factory building is to be added to the plant of the New Britain Machine Co., New Britain, Conn. It will be one story, of brick and steel, 100 x 340 ft., with floor of concrete. The Aberthaw Construction Co., Boston, has the contract. Along one side of the building will be a shipping platform, 14 x 340 ft.

Philadelphia

PHILADELPHIA, June 3.

The Rowe Motor Mfg. Co., manufacturer of motor trucks, removed its entire plant and offices from Downingtown, Pa., to Lancaster, where it occupies a new plant. To provide additional facilities it has purchased 3½ acres adjoining this property and holds an option on 4 more for possible future development. L. S. Allen is the vice-president.

A new one-story punch press plant will be constructed by the Super Glass Co., Philadelphia, at its works on Disston Street, Tacony.

The Navy Department, Philadelphia, will build an iron and steel working shop at the Navy Yard, League Island, to be known as a smithery works. Contract for construction of foundations for machinery, etc., has been awarded to the Hughes-Foulkrod Co., Commonwealth Building, at a cost of \$33,000. The department is also taking bids for a new locomotive shop at Fort Mifflin.

The New York Shipbuilding Co., Camden, N. J., is taking bids for the construction of a one-story steel and concrete plate and angle shop, 200 x 594 ft. Plans are also under way for a new steel fabricating plant. Contract for the erection of a two-story, brick office building at the works has been awarded to Doyle & Co., 1519 Sansom Street, Philadelphia, at a cost of \$75,000. Plans are being prepared for a one-story forge shop, 45 x 55 ft.

The Delion Tire & Rubber Co., Trenton, N. J., has increased its capital from \$3,500,000 to \$4,000,000.

The Aldrich Pump Co., Bethlehem, Pa., is planning the erection of a one-story foundry, 45 x 80 ft.

Following the destruction of a large portion of the forging department of the Milton Mfg. Co., Milton, Pa., manufacturer of nuts, etc., on May 31, plans have been started for the erection of a new steel building to replace it.

The Lenni Steel Co., 130 South Fifteenth Street, Philadelphia, is considering the construction of a one-story foundry at its works at Lenni, Pa.

The McClintic-Marshall Co., Morris Building, Philadelphia, will increase the capacity of its structural steel plant at Pottstown. The output will be devoted largely to the production of material for the shipbuilding plant at Hog Island, Philadelphia.

The Philadelphia & Reading Railroad Co., Philadelphia, is taking bids for the erection of a one-story brick and concrete machine shop, 50x150 ft., at Rutherford, Pa.

The Dicke-Luttrell Propeller Co., Philadelphia, has been incorporated in Delaware with a capital of \$20,000 by F. R. Hansell, Land Title Building, Philadelphia; and S. C. Seymour, Camden, N. J., to manufacture aeroplanes and aircraft parts.

The new foundry addition to be erected by the Aetna Foundry Co., Twenty-second Street and Allegheny Avenue, Philadelphia, will cost about \$10,000. It will be one-story, 50 x 70 ft., and 20 x 50 ft., and will be equipped with a 10-ton electric traveling crane.

The American Manganese Bronze Co., Rhawn and Hegerman streets, Philadelphia, has filed plans for an addition to its foundry.

The Pennsylvania Range Boiler Co., 2024 North Tenth Street, Philadelphia, will build a one-story addition to its welding works.

Baltimore

BALTIMORE, June 3.

The Curtis Bay Copper & Iron Works, Curtis Bay, Md., has filed incorporation papers with a capital stock of \$1,000,000 to carry on a copper and iron business and build and repair ships. M. C. Whittaker, Curtis Bay, is resident agent. The directors are Horatio S. Rubens, M. C. Whittaker, W. F. Cochrane, P. J. McIntosh, William R. Coe, Adrian H. Larkin and E. W. Harden.

The American Chain Co., Bridgeport, Conn., will increase the capacity of its plant at Norfolk, Va., by the erection of two additions. The structures will be built under the supervision of the Government and will be used for the manufacture of anchor chains for the Shipping Board. W. B. Lashar is president.

A Slaysman, 807 East Pratt Street, Baltimore, has awarded contract to J. H. Kelly, East Biddle Street, for the construction of a three-story machine shop, 50 x 55 ft.

The Commercial Oxygen Co., Baltimore, manufacturer of industrial oxygen, has increased its capital from \$200,000 to \$1,000,000.

The Bethlehem Shipbuilding Corporation, Bethlehem, Pa., is said to be planning four new shipways at its Sparrows Point works, with auxiliary shop buildings, including forge, iron and steel shops and erecting works for steel vessels. The extension is estimated to cost over \$1,000,000.

McArdle & Cooney, 519 Arch Street, Philadelphia, Pa., manufacturer of iron pipe, fittings, etc., will build a one-story addition to its works on the Key Highway, Baltimore, of steel and concrete, 30 x 155 ft.

The Parker Steel Co., Parkersburg, W. Va., has been incorporated with a capital of \$50,000 to manufacture steel and iron specialties. H. W. Russell and G. L. McKim are the principal incorporators.

A two-story boiler plant, including engine room, about 46 x 100 ft., will be erected by the State Normal School, Fredericksburg, Va.

The Metal Egg Crate Co., Kenois Building, Washington, will build a one-story plant, 50 x 150 ft., at Fredericksburg, Va., to cost \$10,000.

An electric power plant for works operation will be constructed by the Hoffman Coal Mining Co., Kingwood, W. Va., recently incorporated with a capital of \$30,000. Oscar Hoffman is president.

The Economy Food Dryer Mfg. Co., Birmingham, Ala., has recently been organized to manufacture food-drying machinery. J. L. Morrow is president and treasurer.

The Birmingham Machine & Foundry Co., Birmingham, Ala., is planning to rebuild its pattern works, partially destroyed by fire.

Chicago

CHICAGO, June 3.

David A. Wright, 568 Washington Boulevard, Chicago, manufacturer of machine tools, has purchased the former plant of the Allis-Chalmers Co., Washtenaw Avenue and Twelfth Street, and is equipping it with machinery for manufacturing Fifield lathes, special double-end gun boring and turning lathes, and a new combination, composite lathe and planer for big work of which he is not yet prepared to give details. Mr. Wright has been building Fifield lathes in three separate plants, but will now bring his operations together. His new factory stands on a site containing 122,500 sq. ft., of which about 90,000 sq. ft. is under roof. The main building is 140 x 500 ft., and is equipped with a traveling crane. He will use electric power.

The machine-tool trade is looking for heavy buying on the part of the railroads now that the director general of railroads has indicated the amounts which have been allotted to the roads for repairs and improvements. The New York Central has issued a list for its lines west of Buffalo which probably is a forerunner of what the trade expects. It is recalled that about two years ago several roads tentatively put out lists, but took no action, hoping that prices would recede. Inasmuch as they did not buy at that time, their present need is the greater. It is noticeable that present railroad requirements include a large percentage of comparatively small tools on which delivery is easiest.

The Government is actively expediting delivery of machine tools to its arsenals and navy yards. When a shipment is made, it is required of the shipper that he notify a freight board in Washington, action which not only keeps the Government apprised of where tools are, but enables it to push delivery. In line with this endeavor division freight superintendents must report to the freight board just what cars pass them each day.

Manufacturers of turret lathes experienced a splendid month in May, a much better showing being made than in the corresponding period last year, and this in spite of the fact that no really large orders were booked. As commented on heretofore, numerous miscellaneous orders came from scattered sources in and around Chicago.

The difficulty faced by makers of nonessential products in getting raw material, particularly steel and castings, is beginning to make itself felt, notably in Wisconsin. Many small plants are slowing up, and some are on the verge of a shut down. They are eager to get Government work to keep their organizations together.

Various meetings of business men have been held in Chicago looking to the formulation of plans to bring more war work to the city, both the Illinois Manufacturers' Association and the Chicago Association of Commerce being actively interested. It is regarded with satisfaction that more Government work is coming West than was the case a few weeks ago.

Bids have been taken for a two-story factory at Sacramento Avenue, near West Lake Street, Chicago, for William H. Vallas, sheet metal worker and roofer, 2855 West Lake Street. The cost will be \$20,000.

The Continental Can Co. has leased a five-story factory, 2219 to 2239 South Halsted Street, Chicago, which will be used for manufacturing purposes.

The International Harvester Co., Chicago, which has in hand a contract for rifle grenades, has purchased 40 lathes and a number of drilling machines.

The L. Wolf Mfg. Co., Chicago, which has been making inquiry for shell-making equipment, has not definitely completed its plans for the manufacture of 155-mm. shells. It contemplated a production of 3000 per day.

It is reported that Frank D. Chase, Inc., 122 South Michigan Avenue, has been retained to prepare plans for a shipbuilding plant at Muskegon, Mich., for the Peninsular Shipbuilding Co. Details are yet to be worked out.

Contracts have been let for a one-story addition, 21 x 50 ft., to a power plant of the Commonwealth Edison Co., 223 East Grand Avenue, Chicago, to cost \$8,000.

The F. M. Barton Co., architect, 304 South Wabash Avenue, Chicago, has awarded contracts for a three-story machine shop, 50 x 50 ft., 952 and 954 West Lake Street, for the Henry Lindahl Machine Co., on the premises. It will cost \$18,000.

The Chicago Malleable Castings Co., which has Government work, has purchased from the Whiting Foundry Equipment Co., a plant at 147th Street and Lincoln Avenue, Chicago. The property comprises about five acres improved with brick buildings. It will be utilized as the steel division of the purchasing company.

The Accounting Machine Co., New York, has let a contract for the construction of a factory, 50 x 75 ft., in Grand Rapids, Mich. The building is to be completed in 60 days. The company manufactures the Acme adding machine, and in the new plant will employ about 200 men.

The Diamond Calk Horseshoe Co., Duluth, Minn., has broken ground for the construction of a one-story addition, to cost about \$30,000.

The Henry Lindahl Machine Co., Chicago, has awarded a contract to R. L. Brokob, West Twenty-first Street, for the construction of a three-story addition at Lake and Morgan streets, to cost about \$50,000.

The Prima Talking Machine Co., Chicago, has been incorporated in Delaware with a capital of \$98,000 to manufacture talking machines. W. W. Gardner, A. D. Beanton and J. G. Burns, Chicago, are the incorporators.

F. McNellis, 508 South Racine Avenue, Chicago, has filed

plans for the construction of a new one-story brick foundry to cost about \$10,000.

The Union Special Machine Co., 300-314 West Kinzie Street, Chicago, is building a three-story and basement addition, 100 x 100 ft., to cost \$250,000.

The Liberty Manganese Co., Chicago, has been incorporated in Delaware with a capital of \$200,000 to manufacture manganese products. E. F. Lenden, V. H. Surghmer and S. B. McConnice, Chicago, are the incorporators.

The Continental Can Co., Forty-sixth Street and Grand Avenue, Chicago, is building three additions to its plant to cost about \$125,000.

Milwaukee

MILWAUKEE, June 3.

Pending further developments of the Government's requirements for machine-tools, the trade has shown some slackening. The condition is only relative and local tool builders are being offered all the business they can handle under present conditions. It has been possible the last few weeks to make some gains in deliveries on the lighter types of tools, but shops are sold up far ahead on the heavier machines, which continue in pressing demand.

The acute shortage of iron and steel casting facilities is reflected in the brisk activity in new foundry construction and enlargement projects. It is believed that every available foundry in Wisconsin has been pressed into service to take a part of the large excess of needs among Government contractors in Milwaukee and other industrial centers.

The labor situation grows more unfavorable. An instance is noted where an offer of 45c. per hr. was made for common labor the past week, with few takers.

The Pressed Steel Tank Co., Milwaukee, with works on Greenfield Avenue, West Allis, has engaged Klug & Smith, consulting engineers, Mack Block, Milwaukee, to prepare plans and supervise the construction of a one-story brick and steel addition, 50 x 75 ft., to its galvanizing shop. Work will begin at once. Richard H. Hackney is general manager.

The Century Pen Co., Whitewater, Wis., manufacturer of fountain pens, is contemplating the erection of a new factory. An architect has not yet been selected. J. N. Humphrey is general manager.

The Falls Motors Corporation, Sheboygan Falls, Wis., for many years conducting a large department for the manufacture of wood-working machinery and tools, has discontinued this line in order to concentrate upon high-speed gasoline engines. The Falls company has entered into a contract with the Jenkins Machine Co., Sheboygan, maker of wood-working machinery, granting it the exclusive rights to the manufacture and sale of its line. By this transfer, the Falls company gains valuable capacity needed to handle large Government contracts for gas engines, engine castings and parts. A machine-shop addition is now being completed. A. R. Clas is secretary and treasurer.

The Ladish Drop Forge Co., Packard Avenue, Cudahy, has awarded a contract to Klug & Smith, consulting engineers, Mack Block, Milwaukee, to design and erect a brick and steel boiler house addition, 50 x 60 ft.

A syndicate at Clintonville, Wis., has acquired practically the entire water power rights on the Little Wolf River at Little Wolf, Phillips, Ostrander and Royalton, Wis., and proposes to construct dams and hydroelectric power plants developing approximately 2500 hp. Tentative plans and specifications are being prepared and it is hoped to undertake initial work this year. W. A. Olen, president Four Wheel Drive Automobile Co., Clintonville, Wis., is one of the principals in the project.

The Universal Machinery Co., 734 Thirtieth Street, Milwaukee, manufacturer of machine tools, broke ground last week for the foundry unit of its new manufacturing group in West Allis, and will award contracts soon for the machine-shop unit, which will be 150 x 480 ft., one-story, of steel, reinforced concrete and brick. Plans are being completed by Frank E. Gray and Val. A. Siebert, associated architects, 86 Michigan Street, Milwaukee. E. L. Devlin is president.

Interests affiliated with the Madison-Kipp Lubricator Co., Madison, Wis., have acquired a site of five acres in East Madison. No statement as to the use of the property is available at this time.

The West Bend Heating & Lighting Co., West Bend, Wis., is building a two-story brick and concrete addition, 25 x 40 ft., and will install some automatic stoking and coal and ash handling equipment.

Articles of incorporation were filed in Milwaukee County last week in behalf of the Nash Motors Co., with a capital stock of \$250,000. The incorporators are A. P. Conman,

Jr., and Oscar W. Leser. No further information is obtainable at this time. A corporation of the same name is located at Kenosha, Wis., and is one of the largest automobile manufacturing companies in the Middle West.

The Central South

LOUISVILLE, June 3.

A local demand for boilers, engines, electrical equipment, etc., is noted, due to an increase of approximately 35 per cent in power rates for central station service to large consumers. Numerous industrial companies which did away with their private power plants are anxious to install new machinery, but from present indications there is very little chance of securing even second-hand machinery for some months to come. Two western Kentucky distilleries were sold a few days ago to companies which will wreck them to obtain the copper metal in the stills and to secure boilers, engines, mills, etc.

The Vendome Copper & Brass Works, Louisville, has recently secured a Government order for the copper work on 100 submarine chasers which will keep the plant busy for several months.

The Standard Sanitary Mfg. Co., Pittsburgh, Pa., is moving its entire brass department from that city to Louisville to be consolidated with its brass foundry there. The Pittsburgh shops are making shells for the Government and will retain all its men at that point. Fourteen cars of machinery have been brought to Louisville for installation in a new building under construction.

The welding shop of the Republic Welding & Vulcanizing Co., Louisville, was damaged by fire to the extent of \$2,000 on May 27.

The Columbia Truck Co., 119 South Seventh Street, Louisville, is erecting a garage at cost of about \$20,000 and will require a drill press, lathe, overhead crane and general shop equipment.

The J. J. Reilly Mfg. Co., pump manufacturer, Louisville, has increased its capital stock from \$50,000 to \$150,000. Charles F. Grainger is president.

Otey H. Harris, 512 Lyric Building, Birmingham, Ala., is in the market for a 20 ton Jeffrey locomotive.

The Ripley Oil Mills, Ripley, Tenn., desires a 20 x 42 in. left hand Corliss engine and a second-hand 75-hp. crude oil burning engine.

The Roy C. Whayne Supply Co., Louisville, desires prices on two and three drum hoisting engines, with and without boilers.

The Marion Coal & Lumber Co., James Building, Chattanooga, Tenn., is in the market for water pumps, portable sawmills, and tractors and trucks for handling lumber.

The Louisville Tin Tag, Novelty & Mfg. Co., Louisville, has recently been organized by Henry A. Schwieters and W. R. Tischendorf to manufacture tin and metal specialties.

Cincinnati

CINCINNATI, June 3.

A number of plants in this vicinity have contracts for building parts for the submarine chasers being put out by the Ford Motor Co., Detroit. Few of these companies have been compelled to add anything except special equipment, as they were practically fitted up for handling the work.

Large machine tools are needed by the Ordnance Department and also by many firms having contracts for guns and other heavy work, but deliveries on any new contracts will necessarily be very slow on account of urgent orders that are already in hand. The demand for small machine tools is improving, but no lists of consequence are out.

Building operations in Cincinnati for the month of May show a decided falling off as compared with last year. The total estimated cost for improvements this year was \$800,125 against \$2,363,175 for the month of May, 1917. About 80 per cent of all building now under way is for additions to plants having work that is closely connected with the war the war program.

The Cincinnati Pulley Machinery Co. has decided to make a further extension to its plant in Covington, Ky., and will add a brick addition to the rear of its main building, 50 x 57 ft. This is separate from the addition recently mentioned as being almost completed.

The General Briquetting Co., Chicago, has leased a building from the M. B. Farris Lumber Co., Winton Place, Cincinnati, and is installing equipment for making briquettes from cast iron borings. All necessary equipment has been purchased.

The United States Lathe Co., Cincinnati, has let contract

for an addition to its plant at 2101 South Street to the L. Gott Building Co., Cincinnati.

The Ferro Concrete Construction Co., Cincinnati, has been awarded contract for remodeling the plant of the John B. Morris Foundry Co.

The Lodge & Shipley Machine Tool Co., Cincinnati, lathe maker, has had plans prepared for an addition to its plant on Colerain Avenue, 90 x 540 ft., of sawtooth roof construction.

The Cincinnati Planer Co., Oakley-Cincinnati, will make an addition to its plant, 50 x 120 ft., of sawtooth roof construction.

In addition to improvements already under way the Polak Steel Co., Cincinnati, will enlarge its forging shop at its plant at Carthage.

The Hooven & Allison Co., Xenia, Ohio, cordage maker, has secured a site in the Camp Washington district, Cincinnati, on which it intends to erect a plant some time in the future.

The Dayton Body Co., Dayton, Ohio, has acquired an additional site adjoining its plant on which it expects to erect a factory at an early date.

The Platt Iron Works Co., Dayton, has applied for a permit to erect an addition to its plant, estimated to cost \$15,000.

The Sheffield Tool & Machine Co., Dayton, has increased its capital stock from \$25,000 to \$100,000 and will increase the capacity of its plant in the Beaver Power Building.

The plant of the C. A. S. Products Co., Columbus, Ohio, was recently damaged by fire, the estimated loss being \$33,000. Rebuilding plans are under way. The company is engaged in the manufacture of automobile parts and lately has been devoting most of its attention to a Government contract.

Detroit

DETROIT, June 3.

Continuous orders by munition manufacturers for the best grade machines, especially grinders and milling machines, has kept the machine-tool market above normal. Practically all machinery ordered in this district is for munition work. Deliveries require from six to eight weeks. The demand for second-hand machinery is light.

The Peninsular Power Co., Houghton, Mich., is erecting a power plant on the Brule River to generate 5000 hp.

The Consolidated Press Co., Hastings, Mich., has broken ground for an addition, 160 x 422 ft., to be used as a foundry, pattern shop and storage room. Frank D. Chase, People's Gas Building, Chicago, is the contractor.

The Saginaw Malleable Iron Co., Saginaw, Mich., it is reported, will be doubled in size within six months.

George H. Hannum, representing the Peninsular Shell Co., Saginaw, Mich., has announced that he has secured a contract for 1,000,000 trench mortar shells, making a total of 3,000,000 now ordered from the plant. The company is now assembling 10,000 shells per day, and this will be increased to 30,000.

The Accounting Machine Co., New York, controlling the Acme adding machine, has secured a factory site in Grand Rapids, Mich., and will build immediately. The officers are: President and general manager, John H. Harris; vice-president, H. H. Stein; treasurer, R. D. Byrne; secretary, Daniel Connor, all of New York. Mr. Harris will move to Grand Rapids as soon as the plant is completed.

The plant of the Arthur Colton Co., Jefferson Avenue and Chene Street, Detroit, is being considerably enlarged through the building of a three-story addition, 60 x 153 ft. The twist drill department will increase its production facilities through the addition.

The Industrial Foundry Co., St. Johns, Mich., plans to double its output of gray-iron castings through additions to its plant. John Spusta is president.

W. C. Durant of the General Motors Corporation has announced that he will establish a gray-iron foundry in Saginaw, which will employ close to 1000 men to start with. It will be built immediately north of the old Marquette plant, and will occupy buildings 600 x 1400 ft. This plant will supply part of the requirements of all the subsidiaries of the General Motors Corporation.

The new plant of the Charles B. Bohn Foundry Co., Hart Avenue and the Detroit Terminal, Detroit, is nearing completion. It will be 300 x 300 ft., with an output capacity of 40,000 to 50,000 lb. of castings per day. A general line of jobbing brass, bronze and aluminum castings will be produced. The officers of the company, which is capitalized at \$300,000, are: President, Charles B. Bohn; vice-president,

W. N. Krug, secretary and treasurer, H. W. Holt, manager. O. F. Flumerfelt.

W. E. Wood has announced that he has decided to locate the Wolverine Tractor Co. in Saginaw, Mich. It will manufacture a four-wheel-drive machine with a caterpillar attachment, and has already an order for 1000 for delivery to the Canadian Government.

The Michigan Boiler & Iron Works, Grand Rapids, Mich., capitalized at \$15,000, has taken over the property formerly operated by Henry Brobst as the Central Boiler & Supply Co., at 1130 Monroe Avenue. Peter A. Geldhof and John Snitseler, 723 Lake Drive; William R. Cook, 423 Livingston Street, and Carroll F. Sweet, Kent Hills Road, are the stockholders.

The Commerce Motor Car Co., Detroit, Mich., is building a one-story plant at Solvay and Mackie avenue, 65 x 250 ft., to cost \$25,000.

The Douglas & Lomason Machine Co., Lincoln Avenue, Detroit, has had plans prepared for a four-story plant, 75 x 80 ft., to cost \$20,000.

Cleveland

CLEVELAND, JUNE 3.

The demand for punching and shearing machines for shipyards is heavier than ever. The New York Shipbuilding Corporation, Camden, N. J., is inquiring for 23 machines for a plate and angle shop and the American Shipbuilding Co., Cleveland, has an inquiry out for 11 machines. Recent orders taken by the Cleveland Punch & Shear Works Co., Cleveland, include 11 machines for the McClintic-Marshall Co., 12 for the New York Shipbuilding Corporation, 17 for the Skinner-Eddy Corporation, Seattle, Wash., and 8 for the East Providence, R. I., plant of the Standard Oil Co. Some makers of punching and shearing machinery are unable to promise deliveries before January or February.

The Grant Motor Corporation, Cleveland, which came into the market a few days ago for equipment to manufacture 155-mm. shells, has purchased 36 18 and 26-in. turret lathes and considerable other machinery, including tool room equipment. It is stated that it will equip its Findlay, Ohio, plant for a capacity of 1500 shells per day.

Machinery houses report that the market has quieted down. There is a good demand, however, for small lathes, milling and drilling machines, and considerable inquiry for second-hand small punching and shearing machines. There is not much call for large second-hand lathes.

The demand for locomotive cranes is very heavy. Inquiries include one for 35 cranes and another for 28 from Eastern shipyards. The Chickasaw Shipbuilding Co. is inquiring for 15 to 18 cranes of a special type.

There is a heavy demand for electric tools from shipyards and fabricators doing shipyard work, and some inquiry is now coming out from railroad car shops. Pneumatic riveting hammers are in heavy demand and considerable business is coming from Japan and England, and some from Italy and Spain.

The demand for gears for pleasure cars has fallen off, but manufacturers are getting in place large orders from makers of farm and Government tractors and tanks. Gear makers are having trouble in getting gear blanks both in castings and forgings.

Manufacturers of motors have advanced prices 10 per cent. One small lathe manufacturer has made a similar advance, and a few other small price advances have been made in small tools.

The Lees-Bradner Co., Cleveland, will enlarge its plant by the erection of a two-story factory, 60 x 120 ft. The Osborne Engineering Co. is preparing the plans.

The Reflex Ignition Co., 1708 Payne Avenue, Cleveland, has acquired an additional floor in the building it now occupies, and has purchased a site on West 106th Street, where it will probably build a new plant next year.

The Bucyrus Steel Co., Bucyrus, Ohio, has placed a contract for the erection of a foundry addition, 90 x 300 ft.

The Glenn L. Martin Co., Cleveland, has moved into its new plant for the manufacture of airplanes, on St. Clair Avenue. It will confine itself for the present to experimental work.

The Western Machine Products Co., Cleveland, has increased its capital stock from \$100,000 to \$250,000.

The Aetna Brass Co., Cleveland, has acquired a factory at 1635 East Fifty-fifth Street, which it will occupy for manufacturing purposes.

The Hartman & Spreng Co., Mansfield, Ohio, maker of stove and gas supplies, is having plans prepared for a three-story addition, 20 x 50 ft.

Indianapolis

INDIANAPOLIS, JUNE 3.

The Eclipse Mfg. Co., Indianapolis, manufacturer of automobile supplies, has increased its capital stock from \$50,000 to \$150,000.

The A. Kroner Mfg. Co., Indianapolis, has been incorporated with \$50,000 capital stock, to manufacture folding crates. The directors are Andrew Kroner, Robert C. and Hugh Jones.

The Johnson Motor Wheel Co., South Bend, Ind., has increased its capital stock from \$100,000 to \$200,000.

The Sanitary Supply Co., Fort Wayne, Ind., has been incorporated with \$25,000 capital stock to manufacture sanitary equipment for live stock. The directors are J. J. Disser, C. F. Brady and Hodge Jones.

The Service Motor Truck Co., Wabash, Ind., has booked a Government order for 375 Liberty trucks, following the completion of an order for 500.

The Indiana Lamp Co., Connersville, Ind., is considering the erection of a one-story addition to cost about \$50,000. F. M. Ansted is manager.

St. Louis

ST. LOUIS, JUNE 3.

H. H. Hanenkraft, Kansas City, Mo., and associates are in the market for steam shovel and other equipment for operating a coal deposit 12 ft. from the surface near Versailles, Mo.

The Loco Light & Fuel Co., Loco, Okla., has been incorporated with a capital stock of \$25,000 by Percy W. Newton, G. W. Newman and W. H. Rader and are receiving bids for a plant and equipment.

The Medart Patent Pulley Co., St. Louis, will equip a machine shop addition at a cost of \$5,000 for machinery.

The Ordnance Tool Mfg. Co., 2914 Market Street, St. Louis, has been organized to manufacture ordnance tools, fine dies, etc.

The Excelsior Producing & Refining Co., Tulsa, Okla., has been incorporated with a capital stock of \$1,000,000 by J. Everett Jones, Clem E. Steen and others and will equip an oil refining plant.

The United States Refinery Co., John S. Alexander, Oklahoma City, Okla., and others, will equip a plant at Walters, Okla., and are receiving bids on about \$60,000 worth of machinery.

The Colmer-Green Lumber Co., McLain, Miss., has been incorporated with a capital stock of \$50,000 by J. J. McIntosh and others and is in the market for heavy sawmill machinery.

The Demack Motor Car Co., New Orleans, will equip a machine shop and is in the market for drills, lathes and other machinery.

The Contractors' Machinery Co., Kansas City, Kan., is in the market for two 500-hp. water-tube boilers and other equipment.

The Crunden Martin Mfg. Co., St. Louis, manufacturer of woodenware, etc., has awarded a contract to James A. Godfrey, Wainwright Building, for the erection of a five-story addition on Cedar Street, 65 x 125 ft., to cost \$60,000.

A. Gilbert & Son, St. Louis, will build a two-story addition to their foundry on Forest Park Boulevard, to cost about \$10,000.

The Butler Mfg. Co., Grand Avenue, Kansas City, manufacturer of steel products, is planning for the construction of a new one-story plant, 125 x 270 ft., on Eastern Avenue, Sheffield.

The Waco Motor Truck Co., Kansas City, has purchased about 60 acres at East Waco and contemplates the erection of an assembling plant. E. F. Reid is president.

The Warren Foundry Co., Warren, Ark., will equip a foundry and machine shop. Horace Hayward and J. F. Anderson are interested.

The Liberty Mfg. Co., New Orleans, has been organized by Eph Rosenberg, B. B. Hans, and others, and will manufacture electrical and foundry machinery.

The St. Joseph Warehouse & Cold Storage Co., St. Joseph, Mo., J. O. Barkley, president, will install about \$50,000 of ice machinery, etc. H. R. Worsley is architect and engineer.

Texas

AUSTIN, June 1.

The Lufkin Electric Light & Power Co., Lufkin, which has increased its capital stock from \$30,000 to \$45,000, will enlarge its light and power plant. Additional machinery will be installed.

The Boone Tire & Rubber Co., Waco, is having plans prepared for a plant with a daily capacity of 750 tires and 750 tubes.

The Great Republic Tire & Rubber Mfg. Co., Oklahoma City, Okla., has under consideration the construction of a plant at San Angelo for manufacturing automobile tires and tubes. It contemplates an investment of about \$225,000 in buildings and equipment.

The Waterman Lumber Co., which recently purchased a virgin tract of timber embracing 85,000 acres, near Marshall, at a cost of about \$1,500,000, will construct an additional mill.

The Lone Star Silo Association, Denison, will build a plant for the manufacture of cement products at a cost of about \$50,000.

The Pacific Coast

PORTLAND, ORE., May 29.

Machinery for shipbuilding plants is in constant demand, and nearly all business in this section is rapidly becoming subservient to this industry.

The Hewitt Dry Dock & Shipbuilding Co., Tacoma, recently incorporated, will build a plant with 20 ways, 16 for wooden vessels and four for steel.

The Foundation Shipyard Co., Tacoma, will build a new unit to its present yards.

The Northwest Steel Co., Portland, is preparing to build a new steel shipbuilding plant on the Willamette River. It is understood that four ways are contemplated and that the present plant will be duplicated. In addition, all tools and gear for completely outfitting the vessels will be added.

The Bay City Shipbuilding Co., Portland, has been incorporated with a capital of \$215,000 and will immediately begin the erection of a four-way shipyard. The directors are John Nelson and H. E. Hartline, Bay City; W. B. Hollingsworth, W. W. Innow and E. A. Baker, Portland.

The Western Structural Steel & Tank Co., Portland, is building a one-story shop on North Thirteenth Street, at a cost of \$22,000.

The Standard Ice Co., Seattle, has secured a site on Railroad Avenue on which will be erected a concrete ice and cold storage plant, the former to have a daily capacity of 100 tons. The total expenditure will be about \$200,000. F. J. Linne is president.

The Pacific Steel & Boiler Co., Tacoma, Wash., is building an extension, 50 x 315 ft., that will practically double the capacity of its plant. It is engaged exclusively on Government orders for boilers and fire boxes.

The Todd Shipbuilding Co., Tacoma, will make extension to its plant at a cost of \$1,000,000, and ultimately increase its force to about 6000. William H. Todd is president.

The Western Iron Works, Spokane, has taken over the plant of the Mack Machinery Co. and will manufacture gasoline locomotives. Equipment costing \$15,000 is being installed.

The Libby Lumber Co., Libby, Mont., plans extension to its plant that will add 75,000 ft. to its daily output. The resaws will be replaced by gang saws and much new equipment will be added.

The Heffernan Engine Works, Seattle, manufacturer of marine engines and deck equipment, is rebuilding its plant, replacing the frame building with a brick structure. Considerable new machinery will be installed.

The Standard Concrete Shipbuilding Corporation, Tacoma, recently organized for \$250,000, has secured a 40-acre site, and preliminary work will start at once on the construction of yards. The plans call for 10 ways. E. S. E. Selwyn is president.

The Seattle Construction & Dry Dock Co., Seattle, whose plant was recently leased by the Skinner & Eddy Corporation, will construct a ship repair plant and dry dock, for which a site on Harbor Island has been selected. It will have three dry docks, each with a capacity for 12,000-ton ships. Two marine outfitting piers will also be built. The cost is estimated at more than \$2,000,000.

The Southern California Shipbuilding Co., Los Angeles, is planning for the erection of a shipbuilding plant at Los Angeles Harbor to build steel vessels. Application has been made to the Harbor Commission for a lease of about 70 acres. A. E. Cronenwett, 405 Trust & Savings Building, is interested in the company.

The Los Angeles Radiator Works, Los Angeles, has been organized to operate a plant at 307 West Pico Street. William B. Weiss, 857 West Fifty-fifth Street, heads the company.

Canada

TORONTO, June 3.

The Northern Light Motor Co., Wesley Building, Toronto, has taken over a two-story factory at New Hamburg, Ont., and will install equipment for the manufacture of four-cycle, high-speed gasoline motors.

The Holden-Morgan Co., 579 Richmond Street West, Toronto, has commenced the erection of a plant, 100 x 300 ft., at East Toronto, to handle war contracts. In addition to the main building will be heat-treating plants, shipping houses, etc. It is expected to be completed in about two months and will cost in the neighborhood of \$1,000,000, including equipment.

The Corbet Foundry & Machine Co., Ltd., Owen Sound, Ont., has increased its capital stock from \$40,000 to \$100,000.

Walker-Vallance, Ltd., Hamilton, Ont., has been incorporated with a capital stock of \$40,000 by Frederick J. Walker, William E. Vallance, Cecil V. Langs and others to manufacture automobiles, motor cycles, bicycles, engines, etc.

The Lake Superior Dry Dock & Construction Co., Ltd., has removed its head office from Sault Ste. Marie to Toronto.

The Elmira Rubber Co., Elmira, Ont., will build a one-story addition to its factory to cost \$30,000. A. Steen is superintendent.

The Elmira Machinery & Transmission Co., Church Street, Elmira, Ont., proposes to go ahead with the erection of an addition to its plant to cost \$60,000. E. Vice is manager.

The Lumber Products, Ltd., Brunette Street, New Westminster, B. C., will build a sawmill at a cost of \$60,000.

The National Iron Works, Ltd., Toronto, has taken out a permit for the erection of a foundry addition at the foot of Cherry Street, to cost \$15,000.

J. Coughlan & Sons, Front Street, Vancouver, B. C., whose plant was recently damaged by fire with a loss of \$150,000, will build an addition to cost \$200,000. Stanley Coughlan is secretary.

The Brantford Motors, Ltd., Brantford, Ont., is building a new plant which will be ready for the installation of machinery at an early date.

Motor Trucks, Ltd., Elgin Street, Brantford, Ont., has awarded the general contract for the erection of a shell factory to cost \$175,000.

The Atlas Construction Co., Ltd., Montreal, has the general contract for the erection of a three-story addition to the shell factory of Lymburner, Ltd., 360 St. Paul Street, East, Montreal, to cost about \$60,000.

The Dominion Manufacturers, Ltd., 107 Niagara Street, Toronto, is in the market for two 75 hp. tubular boilers, 90 to 100 lb. pressure.

The Bond Engineering Works, Munition and Villiers streets, Toronto, will build a foundry addition at a cost of \$5000.

The Canada Cement Co., Montreal, is again organizing its munition plant for the production of 9.2-in. shells for the United States Government. It has been working on 6-in. shells for several months.

E. Leonard & Sons, manufacturers of machinery, London Ont., have awarded a contract for an addition to cost \$10,000.

Government Purchases

WASHINGTON, June 3.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, as follows:

For Washington, opening June 10, schedule 4586½, 1 grinding machine; schedule 4594½, 1 gage-grinding machine; 4595½, 1 plate-cutting machine; 4596½, 4 drills; 4601½, 2 coil-winding machines; 4602½, 1 key-biting machine; 4603½, 1 band sawing machine; 4604½, 6 engine lathes; 4606½, 6 sensitive drills; 4607½, 2 vertical tapping machines; 4611½, 1 crank shaper; 4614½, 1 motor-driven key-seating machine; also f.o.b. works, 4612½, 1 100-hp. gasoline engine and 1 centrifugal fire pump; for Washington, opening June 11, 1 vertical shaping machine; 4617½, 3 bench milling machines; 4618½, 1 power press; 4620½, 2 drilling machines.

The office of the superintendent, Crow Indian Agency, Mont., will receive sealed bids until June 14, for furnishing one 100-hp. high-pressure horizontal return-tubular boiler.